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JOURNAL  
OF THE  
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ASIATIC SOCIETY OF BENGAL,

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## THE SECRETARIES.

VOL. XXVIII.

Nos. I. to V.—1859.

"It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermittent; and it will die away, if they shall entirely cease."—

SIR WM. JONES,

## CALCUTTA :

PRINTED BY C. B. LEWIS, BAPTIST MISSION PRESS.

1859



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ASIATIC SOCIETY.

No. V. 1859.

*Itinerary, with Memoranda, chiefly Topographical and Zoological, through the southerly portions of the district of Amherst, Province of Tenasserim. With a Map.—By Major S. R. TICKELL, 31st Regt. B. N. I. and Deputy Commissioner of Amherst.*

*And Copious Botanical Notes.—By the Rev. C. S. P. PARISH, Chaplain of Moulmein.*

The following observations pretend to little more than to furnish the route through an extremely wild, in parts utterly unknown and, generally speaking, uninteresting country and people. A considerable portion of this journey was through a tract hitherto unvisited by any European, and in this region were traversed wide intervals, utterly devoid of human inhabitants of whatsoever kind. Wild and unprofitable as the country may now appear, it forms part however of the most accessible line of inland communication between Moulmein, and the capital of Siam, Bangkok; and for this reason alone, the notes here collected may not be altogether useless.

A glance at any Map which includes this part of the world, on however small a scale, shows that the province of Tenasserim is a comparatively narrow strip of land, forming a seaboard to the great southern spur or branch of the Himala, called in Arracan and Burma the Yomadoung (or back bone mountains) which extends southward skirting the districts of Amherst, Tavoy and Mergui, till it passes into the Malayan peninsula. This narrow strip has for its western boundary, from the furthest south, the sea, as far north as Amherst, whence the demarcation is continued northward

along the Thanlweng (*Anglicè* Salween) river as high as about Lat.  $17^{\circ} 52'$  N. about which parallel commences the Shan territory of Zimmey.

Between the above parallel and that of  $15^{\circ} 20'$  N. the land slopes down from N. E. and S. to the basin of Moulmein, so that at, or close to that town, the waters of the Thanlweng from the N., the Gyíng from the N. E., and the Attaran from the S., all join together, ere pouring into the sea. It is a rare topographical feature to find rivers running in such directly opposite courses in so small an area, and having their confluences at such obtuse angles as the Gyíng and Houngthrau. It is evident however that the great watershed is to the S. E. from whence the rivers flow, until stopped by the drainage from the north, the main receivers of which are the Thanlweng and Gyíng, into which the rivers from the southward of necessity flow, and are forced back by the former into a common current debouching into the Thanlweng.

These rivers may be briefly thus described. The Thanlweng which comes from far to the northward in a straight course and from very elevated regions (perhaps 15,000 feet above the sea) is clear, sandy and rapid; until within forty miles of its mouth. The Gyíng, a very short and tortuous river, is muddy, deep, and sluggish; and the Thoungyen, and Houngthrau are narrow, rocky, sandy, but not very swift hill streams, of great length for their size; while the Attaran is muddy, narrow, slow, very deep, and navigable for one fathom draught for about fifty miles from its junction with the Gyíng. At this spot (fifty miles up) two hill streams, the Zum mee, and the Wenyau, clear, sandy, shallow, and not very rapid, join; and their united waters constitute the Attaran.

The whole of the country traversed by these rivers may be briefly described as buried under one vast forest, dense in the hills and their spurs, and on the banks of the streams running from them; and opening out into extensive swamps between the rivers, where the ground usually sinks below the level of drainage, and, being annually flooded by heavy rains, does not admit of the growth of forest trees, or of more persistent vegetation than giant grasses and Arundinaceous plants. Between these two extremes, the natural slope of the land admitting of drainage, and consequently of

moderate natural irrigation, the ground is seized upon for cultivation—chiefly of rice, and, in higher spots, of certain favorite fruit trees, the amount of orchard compared to cereal culture being very large. The whole area thus under cultivation at one time, (for many of the fields, which get exhausted and are never manured, are abandoned every fourth or fifth year to renovate themselves by lying fallow) may be reckoned at one twentieth of the whole country. The cleared and cultivated patches in the hills themselves are too few to interfere much with this calculation.

The population of the district is of course most dense at and near Moulmein. Biloogewn island, most parts of the east banks of the Thaulweng, the Gyíng, and the lower parts of the Attaran, are tolerably well peopled, and inhabited by Talyngs. Further up the rivers and near the foot of the hills the population is chiefly Karén, and scattered, and two or three localities are stocked with Toung-thoos, a tribe whose head quarters appear to be in the Martaban district. These, with a sprinkling of Shans along the Houngthran, constitute the population, irrespective of settlers from East Bengal and Coringa.

Having now attempted a general view of the country and its inhabitants, without entering too much into dry statistical details, I proceed to give a slight retrospect of our journey up the Attaran and Zummee, through the Shan districts of Kyouk-khoung\* and Lengka, to the Houngthrau river, and down it, after a divarication to the highest point of the range on its East, home—the journey occupying from the 31st January to the 7th March, 1859, and comprising a tour of 450 miles in length.

*January 31st, 1859.*—Mr. Parish and I left Moulmein (or rather Obo, its north-easterly suburb) at 0h. 30m. p. m. We were travelling in boats, one, a seven oar, for ourselves, and four others of about the same dimensions conveying our baggage and followers, together with office writers, clerks, and police. These boats, which are of Burmese build and exceedingly long for their beam, are hollowed out of a single tree (the Hopea Odorata or Thengar) and built up with teak topsides, thwarts, flooring, and lockers; and with bamboo and

\* Literally “Hollow Stone” a remarkable cleft, gully, or narrow pass amongst rocks, from which the district takes its name.

mat awnings. They are pleasant enough for two or three hours, but get terribly irksome afterwards, from the confined crouching position they entail. We had the flood tide with us, and, rapidly skirting the suburb of Obo, turned into the Attaran river about 1 p. m. and proceeded up it at the rate of about five to five and a half miles an hour. Stream at its mouth about 150 yards wide; deep and muddy, with low country on either bank. High grass and mangrove-like jungle to our left hand, and the open and populous space surrounding Moulmein to our right. Course S. and S. E. Scattered hamlets on either side, with low (high bush) jungle, till 2 p. m. when we got to Kyik parang, where we were to have halted; but, finding it too early, proceeded and reached the next eligible place for passing the night, Kwan-ngan, at 5.15 p. m. Heartily wearied. We brought the flood the whole way with us, and I calculated the distance at twenty-three miles. About three miles back we passed most romantic scenery. A range of perpendicular rocks, called the Pya doung, of mural limestone, rise sheer out of the water to six or eight hundred feet, on the right or eastern bank of the river; and some extraordinary bold, scarped, insulated rocks are scattered also along the opposite side. On the pinnacles of these rocks we observed numbers of adjutants. These huge birds breed here annually and the rocks are in many places conspicuously white with their dung. There are two species of adjutant—*Leptoptilos Argeela* (our old Calcutta friend) and *L. Javanicus* (a rarer visitor in Bengal), and both breed together on these inaccessible places. The *Argeela* is notably larger than the other: but the eggs of the two species are hardly to be distinguished apart. The villagers of Kwan-ngan are Talyngs.—a heavy, large, good tempered set. They had prepared and cleaned out for us a tolerably comfortable zeyat or serai. Close to this was the village Kyoung, which is always a handsome substantial wooden building, occupied by Phoongyees or priests, and serving generally as schools for the village children, who are taught reading, writing and cyphering by the phoongyees; the latter thus make some return for the benefits they receive from the parents, and this mitigates in some respect the disgust that the whole system of priest worship in Burmah excites.

Rated the Chronometer at 8 p. m. and found it had sensibly changed, in spite of the very gentle motion it had had.

*February 1st.*—Thick fog at 7 a. m. and Thermometer 68°. Halted till noon. Took Observation at 8.30 a. m. for error of Chronometer (assuming this spot to be 8' E. of Moulmein or 6h. 31m. E. of Greenwich, which it is as nearly as possible). Took meridian Observation C and made Latitude 16° 20' N.

Started at 2 p. m. and reached *Attaran* at 5h. 20m. p. m., distance fifteen miles. River as yesterday. Thick jungle on both banks and elephant grass. On the way we passed a range of limestone rocks similar to those of yesterday, and on the same (the east) side of the river, but considerably higher, rising perhaps to 1500 feet. The range is about one and a half mile in length, nearly parallel to the river, but at last joining it at a very acute angle, and jutting into the water, where the rocks form most fantastic caves, hollow domes, and pendants like stalactites hanging over the stream. At the southerly end of the range, they are completely permeated by an oven shaped cave, through which a small tributary falls into the Attaran. We pulled into and through this singular water vault, and from the other side I made a sketch of the scene, looking back to the main river. The limestone here was very hard and compact, in fact a coarse marble, but the people told me it had never been worked. The land at the back of the rocks was being cleared by a roving band of Karéns. Adjutants were numerous on the summit.

*Attaran*, which is a tolerably large hamlet, is built in the elephant grass, which absolutely overshadows the doors; and though this species of vegetation fosters mosquitoes to a degree quite unknown in Hindustan, and though the clearing the whole village of the grass would not be a day's job, yet so lazy and apathetic are the people that they will not take the trouble to cut down a blade! Their only resource is to sit in the evening, and sleep in smoke that would excite universal ophthalmia in less callous beings. I need scarcely say that from sunset till we got inside our curtains, I and my companion were in a state of complete torment.

*February 2nd.*—Procured a specimen of the little "black and red Indian falcon," (*Hierax Eutolmos*) a beautiful little burlesque on the large and savage falconidæ. The country in the interior (we are on the left bank) is an immense extent of high grass, scattered sparsely with timber, many of the trees dead.

Observation at noon gave Latitude  $16^{\circ} 12' 39''$  N.; Longitude by Chronometer  $97^{\circ} 49'$  E. or  $12'$  East of Moulmein.

Started at 2h. 20m. p. m., ebb against us one hour. Reached *Padowk* at 5h. 30 p. m., run fifteen miles. Course S. E. by E. Six miles from Attarau we reached the site of the old fort of that name, opposite which the Zum mee and Wen yau join. The latter comes from the S. The Zum mee from E. S. E. We turned into the latter. The river very deep, 100 to 140 yards wide, banks mud, and high grass. Flood tide sensibly helping us. Padowk we found buried in elephant grass. The mosquitoes swarmed and stung us to madness, and we were obliged to eat our dinner sitting in the smoke of wood fires.

*February 3rd.*—Latitude  $16^{\circ} 6' 23''$  N.; Longitude  $98^{\circ}$  E.

Started at 35m. p. m. against the ebb. River much as yesterday, but more abruptly winding. Banks are increasing in height, rise and fall of tide (springs) about four feet. Little of note to be seen in the monotonous forest on both banks, save a few fishing monkeys (*Macacus cynomolgus*) peeping at us through the bushes, and immediately quarrelling with each other. At 3h. 25m. reached Kya-eng. Ruu nine miles. Course E. S. E. The banks were high and our temporary hut in a pretty cleared space, cheerful, and I am thankful to say, free of mosquitoes. The village is some way inland, through a pretty wood. Shot a specimen of that beautiful bird *Psilorhinus Sinensis*. There were three of them, and I have never seen them so bold. Generally this bird is as difficult to approach as our Magpie in England. *Psilorhinus flavirostris*, which is the well known "blue Magpie" of Darjeeling, has a chatter precisely like that of the British Magpie; while its congener *Sinensis*, which scarcely differs from the other in plumage, has a soft wailing whistle like the note of some birds of prey.

*February 4th.*—Thick fog at 7 a. m. and Thermometer  $64^{\circ}$ . Took a stroll inland with my gun, but saw nothing new. The country is a thin forest of "Eng" trees (a species of *Dipterocarpus* very like the Saul) and here and there swampy patches. *Kyá-eng*, Latitude  $16^{\circ} 1' 49''$  N.; Longitude  $98^{\circ} 6' 30''$  E.

*February 5th.*—Left at 9 a. m. and about seven miles up the stream lost the last traces of the tide. It thus ascends in the springs by

computation sixty-nine miles. I could not find out the site of old Zum mee, a fort or stockade from which the river takes its name, and which in Captain O'Brien's map is placed somewhere here. The Talyngs and Karen s would not, or could not, tell me. These people seldom speak the truth, when questioned respecting the country they live in. The Karen s especially are the most annoying in this respect, but whether they mislead purposely, or from sheer stupidity, is a question most difficult to determine. At 11.30 A. M. came to for a meridian Observation. Left again at 23m. p. m. At 2 p. m. we passed the first scour or rapid. The banks still muddy: but shingly bottom at intervals. At 3h. 30m. p. m. reached *Kapá*, a little Karen settlement of two houses. Some children were squatting down, looking at the wonders coming on shore from the boats. They, both boys and girls, were very pretty and interesting, and clothed in long shirts, like the calico night shirts little boys used to be clad in when put to bed. Great numbers of *Carpophaga Sylvatica* (the "imperial pigeon" of Moulmein) flying about. We shot five: a great addition to our dinner, for these birds are of excellent flavor. To-day's course S. S. E., run sixteen miles.

*February 6th.*—Thermometer 64° at 7 A. M. Hot and muggy to the feel. *Kapá*, Latitude 15° 53' 13" N.; Longitude 98° 12' E.

Remarked two very fine Gaur skins belonging to a Nooksho or hunter, who had killed them on the Wenyau river, and left them here, together with a heap of horribly offensive barbecued meat for sale. The Karen s especially delectate in this kind of carrion.

Weighed at 1h. 30m. p. m. River winding and stream strong and shallow in parts. It is now very clear, but mud has not entirely disappeared. Saw some monstrous limestone rocks about fifteen or twenty miles to the westward. They proved to be the "*Alanteya*," a range on the east bank of the Wenyau, and must be above two thousand feet in height. Reached *Shanzoo* at 4h. 35m. p. m.; run nine miles; course S. by E.

*Shanzoo* or *Nyoung Zum mee* is a pretty cleared spot, with a few very neat houses, pleasantly shaded by large peepul trees, and overlooking the stream from a high retired bank. The village is peopled by a colony of Shans from *Kyouk-houng* to the Southward, an intelligent and interesting people. The community had formed

a really valuable and carefully tended garden or orchard, about four acres in area, and well stocked with plantains, jacks, mangoes, limes or oranges, chillies, and cotton. Of the last however the chief cultivation was round the village. These Shans have a singular appearance, from their shaving their heads all but the vertex, on which the hair is allowed to grow in a patch to about two inches in length, so that each man looks as if he had ornamented himself with a shoe brush, on the top of his skull. There were several Hoolocks (*Hylobatis lar*) dark colored Lungoors (*Presbytes Phayrei*) and large squirrels (*Sciurus bicolor*) on the huge trees over our heads; the branches of which were also crowded with different species of the *Treron* (green pigeons), *Carpophaga Sylvatica*, and one or two large hornbills (*Buceros Cavatus*). They had all become so familiar with the presence of men (in the shape of the quiet peaceable Shans) that it was not till after several shots from our ruthless guns that the animals, both bird and beast, departed to safer precincts. The air has been close and oppressive, and we had some thunder and lightning at night.

February 7th.—Nyoung Zum mee. Latitude 15° 48' 46" N.; Longitude 98° 13' 15" E.

We started at 25m. p. m. The river very picturesque, from its high wooded banks and clear rippling stream. We met fewer rapids or scours than yesterday, and occasionally reaches of very deep and tranquil water. At 4h. 35m. p. m. arrived at Thaláya Zy'k. Course S. by E.; run ten miles.

This spot we found to be a mere landing place on the east bank, from whence a path leads to the wretched scattered hamlets of the Karéus a mile or so inland. We took up our quarters in a bamboo zeyat which the Goung Gyoup or Tahsildar of the division (who accompanied us) had caused to be furbished up for our use, in a partially cleared space of some forty yards diameter, surrounded by dense thickets and forest. The spot was some fifty or sixty feet above the river which forms here a beautiful deep pool, full of fine fish, which sport here quite unheeded by the Karéus, who prefer this food in the half salted, half putrid state, in which it is sold in the Moulmein markets. The truth I suspect is, they are too indolent to be at the trouble of catching them.

This spot ended our voyage. The river is navigable further up for such boats as ours: but so many rapids occur that progress is very tedious. Our journey onwards is by land on elephants, of which we found a considerable assemblage, with their motley wild-looking drivers, all Karéus from neighbouring settlements.

When young, these people are by no means bad looking. Some boys we remarked amongst them to-day were quite pretty, but the Mongolia roundness of their faces, which in youth gives an innocent and pleasing air, imparts an iuane heavy expression in after years. And the filthy practice of chewing pawn is carried by them (from the earliest age) to such an extent, as to be absolutely odious. Few reach maturity with more than blackeued stumps instead of teeth in their gums (from the corrosive nature of the lime mixed with the pawn) and at all hours, at all ages, and with both sexes, the reddened saliva may be seen running out of their disfigured lips, or discharged in incredible quantities from their mouths. The teeth become at first permanently red, and by the age of twenty permanently black, so that the prettiest girl of the tribe when she smiles is changed into a very gorgon. All of them, big and little were furnished with pipes, made out of the curved roots of bamboos with a reed mouth-piece; and when not chewing pawn, they were smoking these. The tobacco they use is grown by themselves on the river banks, and is mild and rather flavourless; but they preferred it to my "houey dew" and "solace."

The dress of the Karéus consists of a long night-shirt looking garment, into the loose sleeves of which both arms or only one (as convenient) can be thrust. The hair they wear long, and bound into a knot on the top of the head, perhaps a little on one side to look rakish. Over the shoulder is hung their invariable travelling bag of stout cotton cloth, white, red, or striped. And in the hand is generally carried the dâ (an awkward lumbering implement half knife, half chopper) which like the Lepchias of Sikkim, the Niwars of Nepal, or the Bhottias of Tibet, they apply to all imaginable uses. A few of them, wear large mis-shapen turbans, and one man a Saukay, or patriarch, was dressed out in a Burmese shaped *engee* (a short shirt coat) of good English superfine blue broad cloth, garnished with the name, in gold letters, of the firm whence it had

emanated, conspicuously placed in front of his raiment, like the most noble order of the Tower and Sword.

It would encroach too much on my limits to give more than an introductory sketch of these people, whose history moreover has been already presented to the world by abler writers than myself. I will only remark that the Karéns we have now to travel with locate themselves along the Zummee river in clearings, which they quit after every two or three years. They are less civilized than the Karéus of the neighbouring Houngthrau river, and although the latter stream is not more than twenty miles distant, they seldom visit it. The Karéns on the Houngthrau possess buffaloes and poultry. Those of the Zummee nothing of the kind, subsisting solely upon a vegetable diet which consists not only of rice and the usual orchard produce, but of jungle fruits, roots, leaves, and even bark, substances which one would suppose nothing but a famished monkey or squirrel would turn to for aliment. To this may sometimes be added a scrap of dry salt fish or barbecued meat obtained by barter from some Moulmein trading boat. The animals, birds, and fishes with which their forests and streams are stocked, they seem neither to make use of, nor notice. They have neither fire-arms nor bows and arrows, nor fishing implements.

In singular contradistinction to such traits of destitution is the fact of their wealth in elephants. Every householder appears to possess one if not two of these animals. They are brought chiefly from the Shan territories: but how these people procure the money to purchase them I never could clearly discover. Many are stolen no doubt. The animals are generally small, valuing at from two to four hundred rupees. They carry little more than what would load a good up-country bullock in India, and from want of proper training are wretchedly slow.

From Thalayá Zyk, a path extends in a north-east direction to Meetan, a large Karén village on the Houngthrau distant two days' journey. There is no direct access to that river from any point further south on the Zummee, owing to intervening ranges and masses of limestone rocks, which are utterly impassable. These extend as far south as Thoon zoo (Lat. 15° 19') where they can be, in military parlance, turned. Our course then lies along their western border to that place, and thence north-eastward.

In the evening wandering gun in hand, I was fortunate enough to shoot an entirely new (undescribed) species of wood partridge (*Arboricola*). It was running so fast down a small hill that I took it at first for a rat or some such animal.

*February 8th.*—Halted—all our elephants not having assembled. Took Observation at noon, and made Thalaya Zyk Latitudo  $15^{\circ} 43' 16''$  N. and Longitude  $98^{\circ} 15'$  E.

The heat in our little bungalow was frightful. The people of this country thatch with the sole view apparently of keeping out rain, not sun. We tried to make matters bearable by heaping boughs overhead. In the evening saw a specimen of that superb bird *Eurostopodus cerviniceps* high in the air. It has much the flight of our fern owl or goat sucker, but on a grander scale.

*February 9th.*—Started at 6h. 45m. A. M. and walked till 10 through dark scrubby jungles, affording cover for any amount of wild beasts: but saw nothing out of the common way, except two or three wood partridges, one of which I shot. Hills were perceptible through the jungles to the eastward. Our course seemed S. E. At 10, mounted my elephant and at 11h. 20m. reached Py'ngwen, distance about ten miles. Our encamping place was in a low dell near the Meetaget river, in jungle so close and dark that it seemed twilight all day. The Karens are very expeditious in clearing and felling, and in running up the little booths in which we eat and sleep, and lucky it is for us they are so, for with houses we have now done. About a mile from our resting place is a Karen clearing, stocked with plantains, some cotton and two or three half dilapidated huts, utterly uninhabitable to us from their filth. The *Meetaget* runs through forests at one time abundantly stocked with teak trees, which have now, however, been nearly all felled and taken away to Moulmein. The clear rippling waters of these brooks gave us a most delicious bath after the heat of the day's journey.

*February 10th.*—Our march to-day was to *Meepra*, on a branch of the *Meetaget*. Latitude  $15^{\circ} 37' 5''$  N. and Longitude  $98^{\circ} 17'$  E. Course S. W. through dreary and dark jungles; distance about eight miles. Some Karen women and girls came to see us from their clearing about a mile off. One of them was remarkably pretty and seemed to know it.

*February 11th.*—Left at 6h. 45m. a. m. Course S. E. by S. distance eight miles to Poonkhau. Latitude  $15^{\circ} 32' 58''$  N.; Longitude  $98^{\circ} 20'$  E. It is a picturesque little clearing with one or two houses on the junction of the *Kyoon* and *Meetaget*. Here we had breakfast, and after taking a meridian observation left at 25m. p. m. and reached *Meetabwee* at 2h. 45m. Distance about seven miles S. S. E. The march lay through a dense forest and along the roots and spurs of a chain of limestone rocks which ran along to our Eastward in a vast wall, with a fantastic castellated ridge, shooting up to 2,000 and 2,500 feet. This is part of the great barrier between the Zum mee and Houngthrau, which I have already alluded to. But it is only during this march that it comes skirting the road so near, and shows itself in its vast proportions. We encamped in a most romantic dell, close to the rocks. At night I heard singularly wild and to me new cries from the direction of the latter: but strange to say, nothing of interest in Zoology has yet been met with, except perhaps to-day, when we captured a most beautiful snake which had climbed up a bush. It was black, banded with zigzags of bright vermillion, with drops in the interspaces of pure white. It was harmless, having teeth along the maxillary or upper jaw bones.

*February 12th.*—Left at 6h. 40m. a. m. We have descended sensibly and left the dry stony jungle for a rich moist soil, the nullahs (small streams) we cross being muddy and boggy. Our course was S. S. E. and Southerly, through profound forests, in some places dark with shade: and always looming over our heads to our left hand (Eastward) the monstrous rocks ran along like an enormous wall. Here and there near swampy places the ground was thickly marked with the traces of deer and pigs; and peafowl were calling all around, but we could see nothing worth shooting! At 10h. 15m. reached *Kroontau*, a spot at the junction of a stream of that name with the Meykathá—which comes tumbling in from the Eastward through an interruption or gorge in the limestone wall. The Zum mee here therefore ceases, according to the Karéns: but in truth the *Kroontau* is nothing but the *Zum mee* followed higher up.

Took Observation at *Kroontau*—Latitude  $15^{\circ} 22' 49''$  N. and Longitude  $98^{\circ} 20' 30''$  E.—and proceeded on our journey. Course

S. S. E. ascending a little into dryer undulating country, through an arid scanty jungle, where the sun beat fiercely. Halted at a nasty spot close to a deep boggy pool, covered with tangle and underwood, near the ruins of an ancient entrenchment or stockade of the Burmans called *Ankanoo*—day's run 17 miles.

*Ankanoo* appears to have been the furthest Southerly position of the Burman Army, which invaded this Provincee. The Talyngs fled before their conquerors and took refuge in the Shan states, and in Bangok the Siamese Capital itself, where they settled and became naturalised, intermarrying with the Shans—most of whom in this direction speak Talyng.

We received here intimation that the Shans (whose territories we are getting near to) had barriaded the only pass into their country—not with hostile intent but from fear of our infecting them all with small-pox, which indeed was then prevalent at Moulmein. I therefore sent off a civil letter to the Governor of the district we had to enter, giving a clean “bill of health,” and intimating that it would be excessively inconvenient for us now to turn back.

*February 13th.*—Marched to Thoonzoo, about five miles E. by S. through a light scattered forest. Passing heedlessly by a pond in the jungle, I suddenly put up a pair of that rare and handsome bird *Anas Melanogaster* (of Blyth, who however I think makes it a *Sareidiornis*.) It is a noble species of duck, as large as a barnacle, and I felt much chagrined at not having been ready with my gun to secure such a valuable specimen.

In this march we turned the flank of the limestone barrier, which appears now to trend to the Eastward and to break up into innumerable insulated groups of rocks. These unite again to the South of Thoonzoo but lose their mural form, and run in parallel rounded ridges from E. to W., the black bare rocks and the scanty burnt up jungle on them, giving a most dreary appearance to the country. But *Thoonzoo* itself cheers the eye by displaying a tolerable extent of open down—a relief to the senses only to be appreciated by those who have journeyed for days through the monotonous forests of Tenasserim. We stopped here to breakfast; examined a little spring welling out of the grass, round which tiger's foot-prints were numerous; noted the three mounds of stones, or cairns, which

were erected here by Captain (now Lient.-Colonel) Macleod, to mark the boundary between the British and the Siamese possessions, and which the latter people have now decorated with flags, &c., as places of worship; and after taking an observation started at 1 p. m.

Thoonzoo,  $15^{\circ} 19' 9''$  N. Lat. and  $98^{\circ} 27' 30''$  E. Long.; Ther.  $88^{\circ}$  at noon.

Height by Aneroid above Moulmein 701 feet.

The remainder of our march to-day was the worst we have experienced. Course N. E. by E. and at about two miles entering the district of Kyouk K'houng (Shan States). I rode an elephant. The path lay up and along a prodigiously steep hill, and it was most nervous work proceeding along the face of it, for the track was just the breadth of the animal's foot and no more, and a slip would have been annihilation: but these elephants never do slip—nobody can recollect such an accident having happened, and one speedily gets to feel at ease on places which would make a stranger shudder. After descending this hill, we proceeded along a muddy quaggy nulla, in a deep dark gorge, which was, I think, the worst part of the trip. The unfortunate elephants sunk at nearly every step to their shoulders, and wrenched their bulky bodies out of the tenacious mud and quicksands with wonderful strength and perseverance. To add to our comforts, we were by and bye all brought up in an inextricable mob by the barriade, for the Karéns who had preceded and headed our column, not daring to break it down had waited for our coming up. As evening was approaching and we had a good deal more of the vile quagnire to pass, no time was to be lost, and I commenced yelling at the people to demolish the barrier: but not a soul would attempt it, till I had struggled and squeezed through to the front, where my own Chuprassies and people cleared the obstacle away, and handed me a gubernatorial edict which was discovered suspended over the abbatis "banning and barring" further progress. Beyond this spot we had about two miles more of the boggy stream, in a dense ratan jungle between steep thickly wooded hills, and at length at 5 p. m. we emerged into a pretty cleared spot, shaded by fine timber, in which lay the village of Weytamaryng.

Our little encampment of booths and wigwams was outside the village, and shortly after our arrival the Governor and suite came to visit us. He was a civil good-natured old man, and all the people a simple pleasing set. They are of the class called Shan Talyngs, to whom allusion was made before; and their countenances are far more pleasant than those of the pure Shans, especially as they do not cut their hair into a brush. We had a long interview with the Governor; who, whether it is etiquette with them, or whether he was deaf, or imagined I was, bawled out every word like a stentor. He spoke in Shan, which was interpreted into Talyng, and that into Burmese. Before parting I civilly remarked to the old gentleman that it would be more considerate to travellers to put his cordon sanitaire at the commencement, instead of near the end of a difficult journey! Total march to-day 13 miles.

*February 14th.*—The place being pleasant to look upon, and accounts of the next march most dismal, we halted to-day.

*Weytamaryng*, Lat.  $15^{\circ} 20' 31''$  N.; Long.  $98^{\circ} 40'$  E.; Thermometer  $55^{\circ}$  at  $6\frac{1}{2}$  A. M.,  $84^{\circ}$  at noon. Height above Moulmein 524 feet. The extremes of temperature have so disturbed the rate of my Chronometer, that, want of time preventing my stopping long enough anywhere to re-rate it, I must trust to Latitude and dead reckoning to fix my positions in future.

In the evening took a stroll through the village. The houses are large, well raised on bamboos, of which they are entirely composed, and very flat in the pitch of the roof, like Swiss cottages. The houses stood embowered in plantaiu trees (these people being exclusively frugivorous) and the low spurs of the hills all round were cultivated with cotton. The marks of pigs were so abundant that I was nearly tempted to sit up at night for them. My offer of ten rupees to any villager who would shoot me one was however met with general merriment as something “really too ridiculous”—not a fowl, duck, or buffalo was to be seen, and all the way from Thaláyazk to the Hounghthrau river, we have to depend on our own commissariat for supplies. Fortunately the possession of a good quantity of Grimwade’s desiccated milk, allows us the real luxury of a good cup of tea and coffee in the mornings; no traveller in such inhospitable regions should be without this admirable substitute for

fresh milk. It is the only successful preparation of the kind I have ever met with, but lest I should be suspected of "towting" for Messrs. Crosse and Blackwell (who sell the commodity) I will sing no more of its praises.

*February 15th.*—We started at 7 a. m. along a dismal bottom between densely wooded hills, threading a nulla—not so horribly boggy as the last. Then up and along a lofty hill and down its Eastern slope across an extent of low hot grass jungle, to Tharawá, a little wretched clearing, where we stopped to breakfast. Course about N. E; distance eight miles. Latitude  $15^{\circ} 21' 24''$  N. and Longitude  $98^{\circ} 36'$  E.

At 1h. 30m. p. m. we started again, and proceeding N. E. mounted into a fine tableland about 2000 feet above sea level (by Aneroid). At  $5\frac{1}{2}$  p. m. reached *Loongtikoung*, a charming little village of some six houses surrounded by small rounded hills, entirely cleared from jungle, for several acres. It reminded us of a Swiss chalet for the houses of these Shan Talyngs are very Swiss in appearance. The poor people and their pretty but dirty children stared at us in pure astonishment, for we were the first "white mans" they had ever seen. A few kind words, however, soon encouraged them, and presently a couple of sturdy urchins were vying to be foremost in getting Mr. Parish Orchids and other flowers. We found it very cold at night. Thermometer  $58^{\circ}$  at 10 p. m. Our day's run has been about sixteen miles.

*February 16th.*—Thermometer  $52^{\circ}$  at 7 a. m. At 9 a. m. Thermometer  $63^{\circ}$ . Water boiled at  $210^{\circ} 4$  giving 1918 feet above the sea. The Aneroid gave 1929 feet. Took a sketch of the village, and a look at the surrounding country from a neighbouring height. *Lanki p'ha* a remarkable limestone rock close N. of *Thoonzoo* bore W. by S. peeping above the tableland we had crossed yesterday, and the whole Northern horizon was shut in by a tumultuous sea of hills through which the gorge, along which runs the *Meykatha* could be here and there distinguished.

Lat.  $15^{\circ} 23' 34''$  N. Long.  $98^{\circ} 42'$  E. Thermometer at noon  $87^{\circ}$ .

Left *Loongtikoung* at 30m. p. m., course E. N. E., and reached *Mongoosá* at 2h. 45m. p. m. stopping to rest a little at *Meykatha*, a little hamlet close to the hill stream of that name, the

mouth of which we had seen at Kroontau on the 12th. It was surprisingly large and deep, considering the length of its course, and its beautifully clear waters tempted strongly to a bath. The *Meykatha* comes from near a lofty abrupt mountain which the Karéns pointed out, apparently twenty miles off to the S. S. E. The hill said to be stockaded and the head-quarters of the Governor of *Lengka*, a district we enter to-morrow. It is called by the Burmese "*Lengka tat*" (*Lengka* fort); by the Shans "*Kho-ya*"; and by the Karéns "*Klong p'hado*" (great hill). At *Mongtoosâ* is a small colony of Shan Karéns, who, men and women, sat close round never taking their eyes off us while day-light lasted. Our ablutions and toilettes seemed to excite the most intense astonishment, and an examination of my telescope, sextant, and especially the Chronometer with its solemn tick, set them all wild.

*February 17th.*—Our course this morning lay N. N. E. up and along the ridge of a hill called "*T'hee bo*" and towards the highest point of the ridge "*Pansanouk*" where the Aneroid stood at 27.1. On the way I had a snap shot at a barking deer and missed. (One of our party more fortunate killed one the other side of Loongtikoung, the venison of which was excellent). A fine polecat looking animal also crossed the path, but too quickly to be fired at, and also a bevy of the *Rollulus cristatus*, a singular genus of quail procurable occasionally at Mergui. Hitherto I have done nothing in the Zoological way myself, and as to the people, they of course do nothing to help one. The ascent up this interminable hill was most fatiguing, and after four hours climbing, I was glad to sit down on the summit where we had another view of the "*Lengka tat*" about thirty miles S. S. E. The rest of our day's march was a steep descent into a hot grass jungle bottom, and at noon we halted at Toongban by a stream for breakfast, having entered a moderately undulating country, buried in heavy grass jungle and thinly scattered forest trees, interspersed with rugged blackened limestone rocks.

After breakfast, before resuming our journey, there was much deliberation and discussion amongst our Karéns, and we were at length given to understand that the path onward was planted with tiger traps: things about as unpleasant to meet as the animals them-

selves. Our order of march was therefore thus. The most experienced of the Karéns, a slow going imperturbable old fellow, led the way with a large bamboo held to his stomach as if he were angling for eels. The object of this manœuvre will be shortly apparent. Immediately behind him protruded the barrels of my Westley Richards, loaded with ball twelve to the pound, and grasped by myself in readiness for all comers. Mr. Parish, also advanced similarly armed, and our rear was covered by a column of clubs, some spears, and one or two antique muskets (probably unloaded). We had not proceeded in this order very far, before we came on a little bamboo rail, placed there to warn the passenger that a trap is close ahead. Our pace then became funereal. Our Karén leader struck his bamboo on the ground at every step, and presently hit the trap, which went off with a crack, driving a sharp pointed bamboo dagger or spear head across the path in a manner which would have smitten the foremost of us hip and thigh, had it not been for the angling apparatus afore mentioned. For about three miles we plodded on in this manner, passing four or five traps, three of which had been let or shot off, one most evidently by a tiger: for we found the bamboo spear-head, covered with blood and unmistakable black and white hairs. These traps [which are, I fancy, of Malay or Chinese origin] are on the principle of the bows set by our "Bagh Mars" in India. A strong stiff bamboo, with a sharpened pointed piece slightly inserted at right angles into one end, is placed horizontally at about two and a half or three feet from the ground, close to and parallel with the path, and the unarmed end firmly lashed to stakes or posts. The free extremity is then bent back and secured in that position in such a manner, that any object moving along the path and pushing before it a line extended across, detaches the fastening of the bent bamboo, which suddenly straightening, drives the spear-head with great force across the path. These spear-heads are smeared with the poisonous juice of the "as'hyk ben" (a large tree) found in the hills (a sample of which I take this opportunity of sending to the Society). At 3h. 30m. we entered a verdant line of forest and found ourselves on the banks of the *Taylo* a beautifully clear hill stream, falling into the *Houngthrau* about ten miles to the North. We

have therefore passed the water-shed between the Meykatha and the Houngthrau, and may be said to have commenced our journey homeward. We encamped for the night on the banks of the stream, in thin bamboo jungle, and were grievously tormented during our stay by the insupportable stench of a species of Acacious creeper "Soo-bók-beu" like assafœtida: of which there were four or five plants about. The effluvium is so strong as to be plainly perceptible two hundred yards off, but strange to say both Karéns and Talyngs use it to flavour their food! Our march to-day has been fifteen miles. Course N. N. E.

*February 18th.*—There was an alarm last night of a tiger, so that the trumpeting of the elephants, the shouting of the Karéns, and the fragrance of the abovementioned creeper, gave us a charming time of it! At 7 A. M. we were off down the Easterly bank of the *Taylo*, and then along a hot arid grass valley, with rugged limestone rocks in all directions. Several tiger-traps were found here also. This part of the country is said to be full of tigers, and indeed to-day's and yesterday's jungle looked as if made on purpose for them. Nothing could induce the Karéns to follow, with or without me, the tracks from any of the traps which had been let off, to find a wounded animal. The Koles of Singbhook would have done it in a moment: but the Karéns know nothing of wood-craft. We reached *Taylo*, a small Karén settlement on the banks of the stream it gives its name to, at 11 A. M.—a nine mile march.

Observation at noon, *Taylo*,  $15^{\circ} 36' 2''$  N. and Longitude  $98^{\circ} 47'$  E.; at noon Thermometer  $88^{\circ}$ , at 4 P. M.  $75^{\circ}$ ; Aneroid  $28^{\circ} 15'$ .

Towards afternoon the sky began to look threatening, and we were obliged to remove ourselves and valuables underneath one of the Karén houses for shelter. To have occupied the house itself was impossible as the floor was of split bamboo which would have let the leg of a chair or table through directly, so we had no resource but to put up in the filth under the house, or get wet through and lie in the rain all night. Karéns' houses are raised about nine feet from the ground, so we did not want for room below: and by dint of diligent brooming and scraping, mattiug below and arouud, and ceiling with cloths of all kiuds above, we managed to ensconce ourselves pretty well.

*February 19th.*—Left *Taylo* at 7h. 15m. A. M. and reached the *Wenkadoung*, a small stream, at 10h. 45m. course North Westerly, distance about ten miles. The march was entirely through a dreary waste of burnt up grass, black rocks, and a few scattered trees. Our encampment was on the bank of the stream.

Observation at noon, Lat.  $15^{\circ} 39' 18''$  N., Long.  $98^{\circ} 36'$  E. Ther.  $88^{\circ}$ .

After breakfast proceeded and reached the *Lamba*, another stream, about eleven miles. Towards the close of the march we entered very dense jungle, and at our halting-place had to cut down and clear away almost solid masses of thickets to make a little room. Last night's wetting has made some of our people ill. The *Lamba* falls into the *Hounghthrau* about ten miles off to the North East.

*February 20th.*—Marched to the *Lynkama*, a small stream about eight miles to the North West. The path through a thick shady forest. It appeared full of birds but we are too hurried to admit of proper exploring for specimens. To-day and yesterday we were annoyed during our noon breakfast by countless swarms of bees, drones, and flies of endless variety—especially a small indefatigable bee, of which Mr. Parish and I had presently whole *hives* dangling to our backs, hats, &c. Fortunately they did not sting. At breakfast we were heartily sickened by seeing the *Karéns* devour the raw bloody body and entrails of a Monkey I had shot. They swallowed the intestines “au naturel” like macaroni. Towering over the trees near us, was a singular rock, like a huge truncated steeple, full 1000 feet high. At 1h. 40m. continued our journey and reached the *Meytowáng*, another stream [at 4h. 40m. distance six miles] and had a most delicious bath in its crystal waters. On the way I saw a flight of a species of Horn-bill quite new to me, and which I fancied were *Buceros Carinatus*, but there was no getting near them. It is a general idea that birds (and other animals) are tame and unwary in regions where they seldom or never see man: but this is contrary to my experience. They are wildest where they see and *feel* too much of man, as in England, where any tolerably uncommon bird has a shot at him before he can take two hops in any direction. But they are also wildest where they never see man. The ornithological collector must go where he can find a *juste milieu*.

Noon Observation, Lynkama. Lat.  $15^{\circ} 50' 42''$  N.; Lougtitude  $98^{\circ} 26' E.$ ; Thermometer  $88^{\circ}$ . Run to-day fourteen miles; course N.N.W.

*February 21st.*—Started at 7 a. m. in a thick fog travelling through thinly wooded tracts of grass jungle. Came across three of those singular birds *Corydon Sumatranaus*. They are as stupid nearly as boobies or noddies. One that I shot at and missed, remained quietly till I loaded again and killed, the other two sitting looking on. We passed some dried up ponds or pools thickly marked with the foot prints of Gaur and Sâmbur. The Karéns say the Gowers resort to these plains in great numbers in October, at the close of the rains. As we neared the *Houngthrau*, the ground rose and afforded us glimpses of the magnificent hills to the Eastward, Nâpulloo, Dweepameekwyu and Mogadook, but we soon plunged into thickets of tropical density, and pressed our way through them till we stood on the banks of the *Houngthrau*, a beautiful crystal stream, here about fifty yards wide, and running with considerable force. It was so deep that the elephants were all but floated off in crossing, and I ordered a raft to be made for the Chrouometer, which on ordinary occasions is carried suspended to a pole. A steep high bank on the other side brought us into a forest of high trees, and further on a large but much neglected orchard, filled with plantains, jacks, mangoes, and oranges (the last eatable only by a Karén). Passing through this we came to the village of *Meetan*, quite a city after the deserts we had passed through! Our encamping-place was on the right bank of the *Houngthrau*, and we had the satisfaction of seeing our fleet ready for us, the rest of our journey being by water. We had the pleasure here of getting our letters, papers, fresh supplies, &c., not having heard from Moulmein since the 2nd; and the grand luxury of fresh eggs and milk.

*Meetan* contains about fifty houses of Karéns and a considerable deal of cultivation. It is the highest point generally which trading boats from Moulmein reach. They bring up dried fish and such condiments as the Karéns use, also cloth, beads, crockery, glasses, &c., which they barter for hill rice, tobacco, cotton, wax, &c. Smaller boats can ascend a couple of days' journey further, to a place called Kozey Ko Gewu (the ninety-nine islands) where they extend

their traffic to the Shans. I was much disappointed in not seeing this singular place, where the stream is split into numerous channels by small islets, but the Karéns, whether from design or stupidity it is hard to say, brought me past it, and it was now too late to retrace my steps two days up the river. Journey to-day ten miles, N. N. W.

*February 22nd.*—Took Meridian Observation, Latitude  $16^{\circ} 1' 1''$  N.; Longitude  $98^{\circ} 23' E.$ ; Ther.  $90^{\circ}$ .

At 40m. p. m. we got on board the fleet, and went merrily down the pure waters of the Houngthrau. Our boats are mere canoes calculated to pass over the shallows and scours of the stream, and propelled by two paddles forward and one astern to steer, the motion of paddling is smooth and pleasant, and with an awning of leaves and mats overhead, we glided down the stream in great luxury at a rate of six to eight miles an hour. On approaching rocks, narrows, or rapids the bow paddle man stood up, and with a light bamboo in his hand fended us cleverly off the rocks as the current swept us swiftly past them. Now and then as the reach of the river turned to the East, magnificent mountains met the view. At others, the eye swept up long vistas of graceful trees bending over the stream, or perpendicular banks and rocks thirty to forty feet high, past which the glassy waves rushed hurriedly, or spreading into pools, eddied gently along, so pellucid that the pebbles at five or six feet depth were distinctly visible. In fact a more delightful way of travelling than this cannot be devised. We reached the mouth of the Kyik, a hill stream running in from the Eastward at  $\frac{1}{2}$  past 4 p. m. and encamped on the banks for the night. The weather looked threatening again, so had the roof of our wigwam double matted and sloped down as much as possible and made all as snug as we could against a bad night.

*February 23rd.*—Towards morning the rain commenced, and in spite of all precautions the roof began to leak pitilessly, and we had to turn out, roll up bedding, and stow every thing away into the smallest compass. It had been our intention to start for Mooley-it—a celebrated peak about thirty miles to the North East—to-day, and endeavour by forced marches to reach it in two days: but the rain forbade all hope of travelling on elephants through the jungle, and as Mr. Parish's leave had nearly expired, he could not afford

to wait for the weather clearing up, and proceeded at once towards Moulmein. This was a most mortifying conclusion to our journey: for Mooley-it is in fact the only object of much interest in the country: and moreover we lost the benefit of his botanical knowledge in the very place where it would have been the most advantageously exercised.

The sun has approached the zenith too nearly now to allow of a Meridian Observation in the artificial horizon, so took the latitude by 2 p. m. altitudes and made it  $16^{\circ} 8' 58''$  N., and Longitude by Acct.  $98^{\circ} 12' 30''$  E.; Thermometer  $85^{\circ}$  at 1 p. m., at 9.30 a. m.  $78^{\circ}$ . Aneroid 30.1.

*February 24th.*—Determined to pay Mooley-it, a second visit (I had been there in February, 1855,) to verify its altitude by boiling water, my first observation having been made with inferior apparatus. Set off at 7 a. m. crossing the Kyik rivulet, through a flat forest for four miles to the Karén village of Kyik, a mile beyond which we began the ascent of the Kyik hills, a range leading to the Mooley-it mountain. It was severe labour at first, being up through Karén clearings on which the sun blazed without the grateful intervention of foliage. By 12 o'clock I was quite knocked up and mounted my elephant, and at 1 p. m. we reached Teewap'hado ("water and great bamboos"), the altitude of which I made by the Aneroid to be 1236 above Kyik. The air was here sensibly cooler and more bracing. Thermometer at 1 p. m.  $83^{\circ}$  our encampment was in a hollow on the hill side, where trickled a small rill, which our numerous elephants and their unruly drivers soon rendered filthy. The thick forest shut out the view: but by occasional glimpses I could see we had been journeying along a narrow ridge, which ascended the whole way, and still kept ascending ahead of us. To our feet both Northward and Southward ran parallel ridges at a distance of about three miles. The whole buried under dense jungle and enormous trees. The path we came by was a mere track, requiring in places great caution in the elephants: and walking on foot was most irksome by reason of the ground being thickly strewn with dead leaves, whose glazed surfaces made it abominably slippery and added infinitely to the toil of the ascent—distance eleven miles.

*February 25th.*—Off at 6h. 45m. a. m. and walked slowly, gun in

hand till 11½ A. M. resting at several places as the ascent was continuous, terribly slippery, and the path choked up incessantly by fallen trees. At 11½ A. M. mounted my elephant, but it was fatiguing and nervous work : for the poor animal could scarcely have gone a mile an hour, and the ascents and descents over slabs of rock, &c. were so steep that he had to go at times entirely on his knees and elbows. We stopped at *Thembauley*, a pretty little cleared spot on the ridge, where the people had built one or two small pagodas, and from hence had a magnificent view of Mooley-it and its neighbour Napulloo, now distant about twelve miles. The Aneroid stood at 25° 25' (far out of the table drawn up for it). 1 P. M. Ther. 78°. From this spot I walked on to Theethoungplee, about three miles along the ridge and descending the whole way, and here we bivouacked at 3 P. M.—distance about twelve miles.

While brushing through the jungle, near Thembauley, one of my people, following with a spare gun, uttered a sudden cry of pain, and turning round I saw him writhing in such a way that I felt sure a scorpion had stung him. In about two minutes he was prostrate and groaning with torture. The Karéns seemed to know or guess what had happened, for they commenced an eager search in the offending bush, and presently pointed out to me a rectangular shaped green caterpillar, with a back bristling with star-headed spines. This they seized between two twigs smashed all to pieces, and rubbed upon the spot where the man had been stung. In two or three minutes the pain ceased and he continued his journey ! I have myself been stung by these little urticarious abominations : but this one must have been of a peculiarly malignant species.

At night we had thunder and lightning and a little rain.

*February 26th.*—Halted to allow some expected supplies to come up. Boiled water at 9 A. M. at 205°. 2; Ther. 71°; giving 3746 feet altitude. Thembauley is about 4000 feet. The Aneroid is quite useless at this height and its reading worked out by La Place's formula gave something outrageous. Thermometer at 7 A. M. 63°.

*February 27th.*—Started at 7 A. M.; Ther. 60°. Path pretty good, level and descending by turns for three miles, then ascending for four more to “Teemeebong” (“yellow sand”), a little partially cleared dell full of bees and gad-flies and a most abominably offensive

species of underwood, *Cloaca seu Stercus olens*, worse actually than the "Soo bôk ben" of evil memory, which had regaled us on the Taylo. Here I had breakfast. Aneroid 24° 6. Thermometer 71° at noon. At 2 p. m. continued our journey and reached the foot of Mooley-it, after going through a belt of small reed or cane-like bamboos, at 4 $\frac{1}{4}$  p. m.—distance four miles. It was thundering, and looking dreary in the dark hollow, and overhead the clouds were scudding past the peak. So hoping to get above the level of the threatening rain, pushed on, on foot, and after a steep ascent reached the plateau of Mooley-it at 5 p. m. It was hazy and bitterly cold, but so charming to see an open down like a Cumberland "fell" after the monotonous jungle, that I raved about in extasies, to the amazement of my retinue. Ther. 51° at sun-set. They had made me up a snug little hut or booth under the lee of some dense copse-wood which sheltered our encampment from the driving mist and bitter wind, and it only wanted a congenial companion to make everything perfect.

*February 28th.*—6 a. m. Ther. 51. The open down or upland which forms the plateau of Mooley-it is about six or eight acres in extent. It is covered with a short harsh grass, the soil everywhere trodden and pitted by Gaur's feet.\* Over this are scattered little insulated patches of rocks (granite) and stunted shrubs, among which the Botan tea (a species of *Camellia*) and a showy white Rhododendron were most conspicuous. This open space, everywhere undulating, slopes down to the East, and after a descent of three or four hundred feet is met by the jungle. Up its steep western face we had ascended yesterday. To the North it appeared extended in a jnugly ridge at right angles to the one we had journeyed along, and to the South, out of a belt of dense copse-wood (very like the Cape bush jungle), rose the peak of Mooley-it, a bare granite dome, about five hundred feet higher than the plateau. Though the situation of the plateau is beautiful, its area is too limited for a Sanitarium, and moreover water is scanty and has to be brought up a toilsome ascent of some five hundred feet from

\* These animals come up from the valleys in great numbers during the rains, to graze on this upland: secure during that inclement season, in the unbroken solitude of the mountain.

the jungle on the Eastern face. At 1.30 p. m. water boiled at 200.4. Ther.  $66^{\circ} 5$  ( $86^{\circ}$  at Moulmein); giving 6676 feet above that place. Took 2 p. m. altitudes,  $\odot$ , for Latitude, and made it  $16^{\circ} 12' 53''$  N.; Longitude by Acct.  $98^{\circ} 42'$  E.

At  $2\frac{1}{2}$  p. m. went up to the peak, the awful grandeur of which was scarcely less impressive at this second visit, than at the first. The path from my encampment lay South, through the thick copse, then emerged into an open ridge, being the edge of the summit of a vast bulging wall of bare granite that to the West sloped downwards indefinitely, its base being hidden by its own convexity. This isthmus led about two hundred yards south, and then rose up into a cone of bare granite, on the summit of which the indefatigably zealous Buddhists had erected years ago two small pagodas. I have been in the Himala both at Darjeling and in Nepal, and also on Table Mountain, but have seen nothing approaching the tremendous sublimity of this most singular pinnacle. It is, to East, South and West, a nearly symmetrical dome, perfectly bare and smooth, saving where here and there a boulder juts out, as if about to plunge into the abyss below. The convexity of the dome conceals three-fourths of its depth, so that the eye glances from its outline at once as it were into infinity; and this gives an impression of immensity which actual measurement does not realize. Below our feet a rolling sea of white mist concealed the further side of the near valleys: but beyond and above these the air was clear, and tier upon tier of vast mountainous ridges lay sharply defined before us. To the South the bluff precipices of Napulloo,\*—a mountain the superstitious Karéns dare not tread,—confronted us; while, sweeping round by the East to North East, the ranges of Dweepa Meekwyn, beyond, that of Mogadook, and beyond, that of Pyukloong, each rising higher, up to probably nine thousand feet, closed up the horizon like a tumultuous sea. From between these ranges, along the valleys, dim in the far depths, ran the streams of the Meeklan, and Meetan,† to the Houngthrau South West; and the Meekla to the Thoungyen North East, with their countless tributaries, all radiating away from

\* The name is compounded of “nat” and “biloo,” spirits and demons.

† Mee or Mey is the Shan or Siamese for a small river, and Meynam for a large river.

this great water-shed. To the North East the above ranges sink into a wild expanse of flat jungle, concealing the Thoungyen, and bounded by the distant Hills of Yahyu in the Shan territories. To North and North West we looked along a chaos of mountain tops, vanishing into distant haze, and forming in fact the great back bone or range which continues from the Yomadoung of Burma proper; and to the West we traced the ridge we had traversed, and the valleys of the Kyik and Teepoo Shanley. The whole of this vast expanse was one sheet of jungle: one sea of thick umbrageous forest: save where a land-slip here and there exposed a patch of red soil on the mountain side, and where the grassy plateau of Mooley-it itself lay smiling at our feet. These mountains are utterly uninhabited, and except in one direction, [between Lampha on the Houngthrau, and Myawadee on the Thoungyen] never traversed or visited by human being. The Karén hauters confine themselves to the spurs next the Houngthrau—Mooley-it itself is a place of pilgrimage, and beyond it, as far as the Thoungyen river, is an unknown blank.

At 3 p. m. Ther. 68°. Water boiled at 199.6. Ther. at Moulmein 88°. Difference of altitude 7171 feet. The aneroid 23.105. Took the bearings of the principal mountains, and a rough sketch of the sublime view. Amused ourselves rolling huge stones down into the abyss, and by sunset returned to our encampment.

The boiling point in the above observations was obtained from repeated violent ebullitions and carefully noted. The Thermometer, an instrument graduated to .01° was immersed in a tall narrow pot up to as far nearly as the mercury would rise; no lid, and steam allowed ready egress. Finally the error of the Thermometer was fixed from numerous observations made at Moulmein and at Amherst (sea level). The Tables from which the results are worked, are computed from formula given in Bourne's Treatise on the Steam Engine.

In 1854-55, when trying the altitude of Mooley-it, I placed the Thermometer in an open wide-mouthed pot, to the depth of about five inches. The mercury had therefore to ascend a considerable portion of tube exposed to the colder draughts of air. It did not therefore rise to more than 198.8, which with a mean temperature

of 73°. 3' gave 7571 feet for the altitude, and by Tredgold's formula 7479. Being respectively 400 and 308 feet too much.

On the 1st March, I left this interesting spot, and on the 7th reached Moulmein, travelling from Kyik Khyoungwa ("Kyik river mouth") by water. The route as follows :

Kyik Khyoung to Asoon	30 miles.	Heungthrau river.
" Kyaeng	30 "	
" Migaloon	14 "	
" Gying	10 "	Gying river.
" Damatha	18 "	
" Moulmein	12 "	

*Descriptions of some birds procured in the Tenasserim forests and believed to be new species.—The skins forwarded to the Asiatic Society.*

1. *Strigidæ*—*Ketupinæ*—*PTILOSKELOS\** AMHERSTII.† (Genus et species mihi.)

Specimen. A nestling—sex not distinguishable.

Dimensions. Length  $1' 3\frac{1}{2}''$ . Wing  $10\frac{1}{2}''$ . Tarsus  $1\frac{3}{4}$ . Femur  $4\frac{1}{4}$ . Bill  $1\frac{1}{6}^3$ .

Details. As far as developed, similar to those of *KETUPA*, but tarsus short, as in *BUBO*, and covered with plumes to the foot, inclusive of the 1st phalanges of the toes. Egrets.

Color. Iris sepia (a marked difference from all the known *Buboninæ* or *Ketupinæ*, which have the iris yellow). Bill and feet pale flesh color, latter with a yellowish tinge; claws blackish, horny. Head, neck and body, including scapularies and wing-coverts, dirty white, tinged more or less deeply with orange-tawny. Each feather marked near its end with an arrow-headed bar of sepia. Head and nape with spots of the same. On the breast these marks take the form of wide broken bars, lapping round the neck. Wing-coverts also irregularly barred. All this plumage is immature and deciduous: but the remiges (which usually at once assume the permanent coloring) are ashy sepia, barred broadly and softly with full sepia, with marbled interspaces. Downy plumes of legs white.

\* (*πτιλον*, a soft feather, and *σκελος*, a leg)

† *HUHUA ORIENTALIS*, (Horsfield), juv., *vide* p. 411 *ante*. *Cur. As. Soc.*

The aberration from *KETUPA* proper in this bird is an important one, as it argues difference of habits. The *KETUPA*, with its lengthened and nude tarsi, is known to plunge down upon shallow marshy bottoms, or into liquid mud up to its knees, and stand or take a few steps about such localities, in search of small Snakes, water Efts,\* or fish. Whereas the true horned Owls, *BUBO*, *ASTO* and *EPHALTES*, with their long femora and short tarsi, snatch their prey from its perch, or from the surface of water, without wetting or soiling the plumose covering of their legs. The *Ptiloskelos* is therefore probably a partly terrestrial bird, as its blunt *Ketupine* claws indicate: but restricts itself to dry spots and is consequently not piscivorous.

The nestling here described was brought from the island of Bellogewn and died shortly after. I have hitherto failed in procuring the old birds, from whom of course more satisfactory deductions could be drawn. But in answer to any argument ascribing the mixed nature of this bird to immaturity, I must bring forward the fact that both feathered and naked legged Owls show their several conditions in that respect, as soon as hatched. I have picked a young *EPHALTES* out of the egg, and found its legs and toes covered with well developed setæ. On the other hand, I have reared two nestlings of *KETUPA JAVANICA*, and their legs were perfectly bare from the first. The dark iris may not perhaps be so good a distinctive generic trait: for I have observed the color of this organ to vary in *EPHALTES* from pale yellow, to orange, and sepia also.

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2. *Sphenuridæ*—*MIXORNIS* (Hodgson) *OLIVACEUS* (mihi).† Spec. male. Woods of Teewap'bado, 1100 to 1500 feet. February 24th, 1859.

*Dimensions.* Length  $5\frac{1}{2}$ ". Wing  $2\frac{1}{8}$ ." Tail  $2\frac{1}{16}$ ." Bill  $\frac{1}{2}$ ." Tarsus 1." M. toe  $\frac{11}{16}$ ."

*Details.* Typical. But it carries a straighter and better raised tail than the type *M. CHLORIS*. Which gives it a more *Sylvian* than *Timalian* look.

*Color, M. and F.* Iris blood red-brown. Bill horny with dusky culmen. Legs and claws fleshy horn. All upper parts reddish olive brown. Wing and tail quills burnt umbre-brown, edge reddish. Frou-

\* I know of no *Salamandridæ* in these regions. *Cur. As. Soc.*

† *PELLORNIUM TICKELLI*, Bl., *ante*, p. 414.

tals and face paler and tinged fulvous. All lower parts from chin, clear pale fulvous, mesially albescent, except on breast.

Not uncommon in the hill-forests, frequenting bamboos and underwood; manners active and restless: silent.

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3. *Sphenuridae*—*TURDINUS* (Blyth) *GUTTATUS* (mihi). Spec. female. March 2nd, 1859. Woods near Theethoungplee. 3000 ft.

*Dimensions.* Length  $6\frac{5}{6}$ ". Wing  $2\frac{1}{6}$ ". Tail  $2\frac{1}{8}$ ". Bill  $\frac{1}{16}$ ". Tarsus  $1\frac{1}{6}$ ". M. toe  $\frac{3}{4}$ ".

*Details.* Typical. (See Appendix to Blyth's report for December meeting 1842. Continued from Vol. XII, p. 1011, Journal As. Soc.) Plumage of front, lores, and chin stiff and setaceous: but rictal bristles not much developed.

*Color. Fem.* Iris sepia. Lids nude and dull smalt. Bill horny, dark on culmen, pale and livid on crura. Legs horny, claws pale. Crown and upper parts rich vinous olive-brown, brightening to full vinous, rusty on upper tail-coverts and outer webs of remiges. Tail as back, obscurely barred blackish. Feathers of crown edged black, a few pale spots on sides of occiput. Frontals ash, striated black. Auriculars dusky, bounded beneath by a white line, which joins a patch of white on ramus continued to bill. Chin and throat pure white, separated from ramus by a black line which spreads into a patch on side of throat. From top of eye down sides of neck and across upper back a space of acuminate, black-edged, white feathers. All underparts from throat rich orange rusty, deepening into vinous brown on vent.

I shot a pair of these birds on the date mentioned above: but could not find the male. It was however exactly similar to the female, and as they allowed close approach, I could easily remark the plumage. Habits active—Scendent (as in *MEGALURUS*, &c). Lurking in dense thickets. Voice a low grating chatter.

This is the third new species of the genus I have discovered in Tenasserim. The other two were sent by me to the Society (through Mr. Blyth) in 1855, and named by that gentleman *T. BREVICAUDATUS* and *T. CRISPIFRONS*. The latter species with its large tail is rather an aberrant form, if retainable in the genus.

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4. *Corvidæ—Garrulacinae.***SIBIA** (Hodgson) **PICATA** (mibi.)\*

Spec. male. February 28th, 1859. Plateau of Mooley-it. 6600 ft.

*Dimensions.* Length  $8\frac{3}{4}$ ". Wing  $3\frac{1}{2}$ ". Tail  $4\frac{1}{16}$ . Bill  $\frac{1}{16}$ . Tarsus  $1\frac{1}{8}$ . M. toe  $\frac{5}{8}$ .*Details.* Typical. The tail less developed than in **S. PICAOIDES**, which in other respects it closely resembles more so than it does **S. CAPISTRATA**.†*Color.* M. Iris blood-red brown. Bill black. Legs horny brown. Head and cheeks coal black with greenish gloss, diluting into intense vinous soot-color on back, and that again into ashy soot on upper tail-coverts. Wings soot, shining a little with indigo. Tail centre pair of feathers as back but paler, the rest blacker, obscurely barred darker, and tipped white, more and more so to external feather which is half black half white. Mere chin black, all from thence downwards milk white.Evidently exceedingly rare, or confined to elevated peaks. A pair only seen, of which the male was secured. Lively and restless, with a Prattling whistle like **S. CAPISTRATA**. Incessantly hopping and flitting about the stunted trees found at that altitude (6600 ft.).

This adds, I believe, a fourth to the known species of this genus.

5. *Merulidæ—Saxicolinae.***RUTICILLA** (Brehm) **ATROCÆRULEA** (mibi.).‡

Spec. Male. February 28th, 1859. Eastern slope of Mooley-it. About 5500 feet.

*Dimensions.* Length 7". Wing  $3\frac{1}{16}$ . Tail  $2\frac{3}{4}$ . Bill  $\frac{5}{8}$ . Tarsus  $1\frac{1}{16}$ . M. toe  $\frac{3}{4}$ .*Details.* Typical. Outline identical with **R. FRONTALIS**.*Color.* M. Iris sepia. Bill and legs black, plumage ashy black all over. Frontals dull small, extending in a line over eye. Nareals, rictals, and all round close to bill velvet black. Obscure tinges of\* **S. MELANOLEUCA**, p. 413, *ante*. *Cur. As. Soc.*† So far as I can perceive, it differs from **S. CAPISTRATA** and **S. GRACILIS** only in colouring. *Cur. As. Soc.*‡ *Muscisylvia* and since *Myiomela leucura*, Hodgson, *vide* p. 416, *ante*. *Cur. As. Soc.*

small here and there on upper parts and on each side of breast, at point of the wings (carpal angle) a small patch of rust colour: being the edges of 2 or 3 feathers. Point of wing pale small. Small coverts blackish indigo. Largest coverts brown black, tipped ferruginous. Remiges black edged grey. Upper tail coverts washed with small. Tail black. The rectrices between the centre and outer pair have their basal half outer webs white, extending more and more towards centre. Belly and under tail-coverts fringed white.

The only specimen seen, sitting on the skirt of a dense thicket, close to a small blind brook. Quiet and still, without the vibratile motion of the tail habitual to all the known Redstarts. But in its conformation, it is undoubtedly a Redstart.

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#### 6. *Pycnonotidæ.*

*PYCONOTUS* (Kuhl) *NANUS* (mihi).\*

Spec. male. March 2nd, 1859. Near Teethoungplee, 3000 feet.

*Dimensions.* Length  $5\frac{5}{16}$ . Wing  $2\frac{3}{8}$ . Tail  $2\frac{1}{4}$ . Bill  $\frac{7}{16}$ . Tarsus  $\frac{5}{8}$ . M. toe  $\frac{3}{8}$ .

*Details.* Typical. Crested.

*Color.* M. Iris blood red brown. Bill dark horn. Legs reddish horn. Upper parts, including a blunt crest, ashy brown. Each feather shafted whitish. Remiges and centre pair of rectrices reddish clay brown. Rest of tail, dusky sepia, more and more tipped, white externally. Chin, throat, and all under parts ashy white.

The only one of the species observed. It was shot on a large tree in company with many other small birds.

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#### 7. *Tyrannidæ—Muscicapinæ.*

*MUSCICAPA* (vera) *PUSILLA* (mihi).†

Spec. male. February, 28th 1859. Plateau of Mooley-it. 6600 feet.

*Dimensions.* Length  $4\frac{1}{8}$ . Wing  $2\frac{3}{16}$ . Tail  $1\frac{5}{8}$ . Bill  $\frac{5}{16}$ . Tarsus  $\frac{5}{8}$ . M. toe  $\frac{3}{8}$ .

*Details.* Typical. Legs a trifle shorter than in the type (*M. ATRICAPILLA*).

*Color.* Male Iris sepia. Bill and legs coal black. All upper parts jet black, deepening into intense indigo black on back. A broad

\* *IXULUS STRIATUS*, Bl., p. 413, *ante.*

† *MUSCICAPULA MELANOLEUCA*, Bl.

superciliary band of white passing down sides of neck and nearly surrounding the occiput. Greatest secondary coverts white with black bases, the white extended along outer margins of 3 als. Remiges brown-black. Tail centre pair of feathers black. The others white, deeply tipped black, which extends laterally, till it occupies nearly all the outermost web. All under and anteal parts milk white.

This is one of the smallest known species of true Flycatcher. A pair were flitting from bush to bush, settling generally on the summits. The female, which appeared brown and white, escaped.

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8. *Tyrannidae*—*Tyranninae*.

*PHYLLOPNEUSTE* (Meyer). Subgen. *PHYLLOSCOPUS* (Boié) *SUPERCILIARIS* (mihi).\*

Spec. Sex not noted. February 24th, 1859. Woods of Teewap'hado. 1100 feet.

*Dimensions.* Length  $4\frac{1}{4}$ '. Wing  $1\frac{1}{16}$ . Tail  $1\frac{9}{16}$ . Bill  $\frac{3}{8}$ . Tarsus  $\frac{1}{16}$ . M. toe  $\frac{5}{16}$ .

*Details.* Are those of *CULICIPETA*, (Blyth), but it lacks the mesial light stripe along the crown. If that indeed be a distinction from a Wood-wren that I sent to the Society's museum in 1855, agreeing to my thinking with *CULICIPETA TRIVIRGATA*, (Temminck). It was named by Mr. Blyth *PHYLLOSCOPUS VIRIDIPENNIS* (n. sp.),† although it had the coronal stripe prominently. The present subject has a considerably grosser bill than the last named, or than *Ph. AFFINIS*, (mihi); and so wide basally as to be almost *Muscicapine*.

*Color.* Iris sepia. Bill blackish horn, reddish at edges. Legs fleshy horn. Head olive darkened with ash: auriculars paler and greenish. A broad dull white supercilium. Chin and throat white, and all the rest of under-parts pure gamboge-yellow. Upper parts olive-green; pure and yellowish. Remiges and rectrices dusky brown, edged green. Lining of wings sulphur-yellow. Inner webs at ends of three outermost pairs of rectrices margined sand colour.

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9. *Phasianidae*—*Perdicinae*.

*ARBORICOLA* (Hodgson) *CHLOROPUS* (mihi).‡

\* *ABRORNIS SUPERCILIARIS*, ante, p. 415. *Cur. As. Soc.*

† A true *REGULOIDES*. *Cur. As. Soc.*

‡ *TROPICOPERDIX CHLOROPUS*, p. 415, ante. *Cur. As. Soc.*

Spec. Female. February 8th, 1859. Thalayá on the Zumee river.

*Dimensions.* Length  $11\frac{5}{8}$ ". Wing  $5\frac{7}{8}$ ". Tail  $2\frac{3}{4}$ . Bill  $\frac{5}{8}$ ". Tarsus  $1\frac{1}{16}$ . M. toe  $1\frac{1}{4}$ ".

*Details.* Typical, but, taking *A. TORQUEOLA* as the type, bill slenderer and claws less lengthened.

*Color. M. and F.* Iris hazel, lids red, orbital skin blackish. Bill dull orange red, dark on culmen, yellowish at tip. Legs and claws greenish yellow. Crown, back of neck, and all upper parts, passing round breast, full olive-brown, barred rather largely black.—Wings the same, but on ternals and great coverts the pattern confused, larger, ground color paler, and ashy marblings in interspaces. Secondaries reddish fulvous, mottled darker, and primaries dusky espia, margined rufous. A few rufous bars on tail, at end and laterally. Auriculars brown. Rest of head including frontals, chin and throat, and a superciliary stripe which extends on each side hind-neck, white spotted black. Fore-neck orange rusty, spotted black; lower breast and belly orange rusty, candescing descending, with semicircular and arrow-headed parallel bars along the flanks. Lower belly and vent whitish: with broad centering of sepia to the feathers on sides, crossed with brown bars. Femorals mottled brown.

This is the second new species of wood Partridge I have been fortunate enough to discover in Tenasserim. (The first was sent to the museum As. Soc. in 1855 as *ARBORICOLA BRUNNEPECTUS*.) It appears tolerably numerous: but as far as my observations go, is entirely confined to the forests on the banks of the Zumee river. Unlike its known congeners, it avoids mountains, and inhabits low though not humid jungles, where the ground merely undulates or rises into hillocks. Like the rest of its tribe, it is difficult to flush, and runs with great rapidity, jumping adroitly over obstacles, and diving into impenetrable thickets for security. Early in the mornings these birds come out on the pathway, scratching about amongst the Elephants' dung, and turning over the dead leaves, for insects. They do not appear to have any crow or call, though during the pairing season this may not be the case. The Karens did not even know the bird: but this is no proof of its rarity, for these people pay no attention to the living products of their forests.

The sexes are precisely similar in plumage and size. The flesh rather dry and tasteless.

In addition to the above 9 species, which I believe to be hitherto undescribed, I have the pleasure to forward to the Society two specimens, male and female, of that little known bird, the *PODICA PERSONATA* of G. R. Gray: who has named it from a specimen from Singapore sent to the British Museum by Lord Ellenborough.

The following observations are taken from fresh subjects.

Tribe. *Macrodactyli.*

Family. *Fulicidæ*—Genus *PODICA*, species *PERSONATA* (G.R.Gray).

Spec. Male and Female, March and April 1859. Kokanee river, near Moulmein.

*Dimensions.* Male. Length 22". Spread of Wings 30". Wing 9½". Tail 4¾" Bill 2". Femur 3¼. Tarsus 2". M toe 2½". Female, rather smaller.

*Details.* Body plump and flat as in *ANAS*, not so heavy as in the Grebes. Neck lengthened: but less so than in *HELIORNIS*. Legs so far back as to compel a nearly upright position when the bird stands. Wings and tail nearly as in *ANAS*. Bill as in *GALLICREX*, longer than in *FULICA*, straight, long, compressed, with rounded culmen. Tip deflexed gradually, and without notch. Nostrils large, midway, ovo-linear, horizontal, pierced at anterior end of a large membrane, which is strongly relieved from culmen above and tibia below. Gonys angulated and short. Gape deflexed and wide. Culmen ends in a straight line across forehead, protruding a little flap on the forehead (as in *PARRA*), but smaller. (This quite disappears in the dry skin.) Tongue linear and simple. Leg as in *FULICA*, pretty stout in depth: but compressed laterally (not so much as in *PODICEPS*), narrow transverse scutæ anteally, rest of leg and toes reticulated. Toes long, the outer and middle ones subequal, inner one shortest. All three lobated, the inner flap of inner toe being broadest. The scallops (one to each phalanx) about as broad as in the Coot. Thumb plain, reticulated, not very short. Claws hooked, long and sharp.

Wings tolerably ample, pointed, as is each remex. 3rd primary

longest, 2nd subequal.  $4\frac{1}{2}''$ . Shorter, 1st one inch shorter. Tail round, acuminate, rather short: coverts long. 14 rectrices with stiff strong quills. Plumage as in *Anas*, *i. e.* not so dense as in the Grebes, or Coots.

*Color.* Male. Iris sepia. Bill horny yellow, dark on culmen and green on forehead. Legs a delicate rice-green, the lobes margined yellow and claws whitish. All upper parts olive-brown, reddest and clearest on wings and tail, and on top of back dulled with greenish ashy. Crown and mesial nape a clearer ashy blue green. Forehead extending in a point to vertex, and again laterally over each eye, black, which covers also chin, face, throat and anteal neck, ending in a point half way to breast. This black space is margined all round with white, starting from posterior canthus of eye, and another small space of white borders the bill at lorum. Breast and flanks pale ashy olive brown, femorals the same. Under tail-coverts and flanks next belly barred white. Belly and lower breast dull brownish white.

Female. Has the iris straw-color; chin, throat and anteal neck, where black in the male, white with a margin all round of black, which extends a little over lorum, and has the same white outer border, as has the black mask of the male. *Cætera pares.*

These very rare birds in Tenasserim are met with in shady, deep, narrow streams in forests, whether in the tide-way, or remotely inland. They swim rapidly: but seldom dive, and although eminently aquatic in conformation, resort, strange to say, for safety to land. Scrambling up the steep banks when shot at, and running with unexpected rapidity into dense thickets, its flight is like that of the Coot, or Water-hen: squattering along the surface of the water. The eggs I have not seen.

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*Botanical Notes made during a month's tour from Moulmein to the three Pagodas and in the Shan States, in the month of February, 1859.—By Rev. C. PARISH.*

Having been asked by Major Tickell, to furnish him with a few botanical notes to add to his sketch of a short tour we lately made in company to Thoonzoo, or the "three Pagodas," and thence, through the Siamese Shan States, to the Houngdrau river, I do so with pleasure, though with some diffidence, as my acquaintance with the Flora of these Provinces is exceedingly limited.

We left Moulmein on the last day of January, and proceeded up the Attaran river in boats.

As the point where we began our journey is so near the sea (only some thirty miles) it may be as well to commence by stating what the prevailing vegetation is between Moulmein and the mouth of the river. Here, then, on the muddy shores, is seen, as usual in such places, the mangrove; but the most noticeable feature in the vegetation, is a continuous jungle of the graceful *Sonneratia apetala*, stretching far in, wherever the land is subject to tidal inundation. Underneath the *Sonneratia* is a dense growth of our common thatch leaf, *Nipa fruticans*. The elegant little Palm, *Phoenix paludosa*, is not unfrequent; and *Cerbera manghas* may be noticed all along the banks, suspending its apple-like fruit over the water. These are the trees that will probably attract particular attention, as one ascends our large river to Moulmein.

Leaving this now, and supposing ourselves to be ascending the Attaran, the plant that appears most abundant is *Paritium tiliaceum*, which grows all along the water line for several miles, forming a perfect tangle with its twisted stems. A very large and handsome *Batatas* may be occasionally noticed twining about it. *Sonneratia acida* has here taken the place of *S. apetala*. *Barringtonia racemosa*, and one or two species of *Diospyros* occur here and there. These are close to the water's edge, while, on the bank, and forming a narrow belt of jungle (inside which is paddy cultivation) *Butea frondosa* grows in profusion. *Salmalia malabarica*, *Barringtonia acutangula*, and *Acaea elata* or *stipulata*, are also abundant.

*Lagerstræmia reginæ* is frequent, with *Pongamia atropurpurea*, *Vitex arborea*, *Ficus*, and other trees. About the villages, the following wild fruit trees are commonly found: *Mangifera oppositifolia*, (Burm. *Mayan*) ; (of this tree there are two varieties, one with sweet, and the other with acid fruit); *Pierardia sapida* (Burm. *Kanazo*), and *Eleagnus confertus* (Burm. *Mengu*) ; *Sandoricum indicum*, (Burm. *Thit-to*) is a frequent tree, the fruit being also eaten: so is *Eriodendron pentandrum*, cultivated for its silky cotton, used to stuff beds and pillows. *Mesua pedunculata* also occurs, though rarely.

The site of the Burmese villages is almost invariably marked by cocoa-nut and palmyra trees; the latter planted wherever there is a Pagoda, or monastery. The Phougees also show their taste by cultivating near their monasteries *Amherstia nobilis*, *Mesua ferrea*, and *Calophyllum inophyllum*.

Some distance up the river, where the plains on either side are too high to be subject to periodical inundation, they are covered with vegetation continuously inland from the banks, and then the prevailing tree is the “Eng” of the Burmese, *Dipterocarpus grandiflorus*. Sometimes this is the only tree for many miles, when it forms a thin open forest, intensely hot, as the trees prevent the free circulation of the air; while, from their scanty foliage, they afford no protection from the rays of the sun. The leaves of the young tree, however, are very large, and are collected by the natives for roofing their houses; also for the sides, when they cannot afford the *Nipa* thatch, or procure the long grass (*Imperata cylindrica*) which is the roofing material in other places. Often intermixed with the Eng, grow *Careya arborea*, *Dillenia aurea*, two or three species of *Erythrina*, *Gardenia*, *Randia*, and a small *Quercus*. In these forests there is little or no undergrowth, but here and there, in the swampy places, patches of high grass.

The fern of the river banks is *Drynaria quercifolia*, which clothes the trunks of all the old trees from top to bottom. *Orchideæ* appear generally to be rare by our river sides, although one would be disposed to think that the moisture would favour their growth. *Loranthus pentandrus* is a common parasite, and *Viscum moniliforme* a rare one. It is in such places that are found those three beautiful

creepers, *Echites macrophylla*, *E. rhynchosperma*, and *E. paniculata*. The first of these yields a considerable quantity of *Caoutchouc*. A very elegant *Rosaceous* creeper is frequent on the river banks; other kinds too are numerous, whose foliage is handsome, but whose flowers I have never seen.

Higher up the river (twenty or thirty miles or so), still within tidal influence, but where the banks are not so muddy as they are below, *Paritium tiliaceum* ceases, and a species of *Salix* (*S. tetrasperma*?) takes its place, and continues until, at about the point where the flood tide fails, it is in turn succeeded by a willow-like *Euphorbiaceous* plant, *Hæmatospermum nerifolium*, as the front occupant of the bank. The *Salix* has here assumed the proportions of a tree, and overhangs it. The same *Euphorbiaceous* shrub also covers the small islands, which are frequent in the shallow and rapid parts of the river.

The appearance of the vegetation has now changed considerably. The banks of the river are steep and high, and the jungle much wilder and more dense. Bamboo, (*Bambusa tulda*?) is abundant; long rafts of it are floated down to Moulmein for building purposes, and other uses. Tall rank grass crowns every spot on the bank that is destitute of trees. *Calamus draco*, *C. verus* and *C. rotang*, are frequent; the two last ascending to the tops of the highest trees and forming an impenetrable tangle below. Nothing can be more elegant than the shining glossy foliage of these slender canes as they wave to and fro to the wind.

Now *Butea superba* will be detected by its deep orange-coloured blossoms, seeming to be those of some large forest tree, at the very top of which they delight to open out. The huge pods of *Entada pursætha* catch the eye. The bright yellow flowers of a species of *Ochna* (*O. lucida*?), having the fragrance of the violet, are a great ornament to the banks. The modest flowers of *Capparis trifoliata* may be frequently noticed, and the petals of creeping *Bauhinias* are seen floating down the stream. *Flacourtie cataphracta* is a not uncommon tree, and here and there, towering above every thing else (the true giant of the forest), a huge wood-oil tree, *Dipterocarpus alatus* or *turbinatus*? *Duabanga sonneratoides* is common in some spots. This is a handsome tree with very large leaves, and branches

which spread out horizontally. The inflorescence consists of large terminal *corymbs* of white flowers, whose weight causes the branches to droop elegantly.

Here too grow many other trees, of which I must confess myself ignorant. Among them, a very graceful one with light birch-like foliage, is especially noticeable, being so abundant as to give quite a character to the vegetation. It had neither flower nor fruit when we passed.

We left the boats at a place called *Thaliya-zeik*, about eighty miles or so from Monlmein by the river course, which is very tortuous; and thence proceeded by land to *Thonzoo* or the three Pagodas.

During the whole of our journey, from the time we left the Attaran until we struck the Honngdrau river (thirteen days), one and the same Geological formation prevailed, viz. mountain (?) limestone; there was consequently a general sameness in the character of the vegetation. It will not, therefore, be necessary to do much more than throw together the names of those trees and other plants, which I noticed in the journey as being known to me.

For the benefit of those who have not travelled in the Tenasserrim Provinces, and are not perhaps aware how rank is the vegetation all over them, it may be as well to mention, that while we continued on low ground, it was a rare circumstance to see more than a hundred yards in advance; and so dense in many places was the jungle, that an occasional sight only was obtained of the tops of the magnificent perpendicular limestone rocks, at the very foot of which we were passing. And afterwards, among the mountains, the case was very generally the same. Anything that could be called a view of the country was rarely obtained, an occasional glimpse of some distant feature in the landscape being all that we could catch through the trees.

At the spot where we left our boats, *Thaliya*, the alluvial plain, which, nearly up to this point, had stretched far away on either side of the river, may be said to have been fairly left behind. Indeed, for some miles before reaching *Thaliya*, the high banks were seen to consist almost entirely of rolled pebbles, cemented into a coarse conglomerate, as if the river, as it wound its way about the

base of the low hills, which begin here, had cut its bed through an ancient sea-beach. From this point our course lay in a generally S. E. direction, through undulating country, having a gradual rise, until at "Thonzoo" a height of some seven hundred feet had been gained. As we advanced, the surface of the ground became more rugged and broken, and more denuded of soil, the limestone rocks protruding more and more frequently, leaving at the "three Pagodas" little else than bare rock.

Along this course, in many places, thick bamboo jungle prevailed with large trees thinly interspersed. In other parts what we commonly understand at home by forest was passed through. The forest portions were generally dry and for the most part destitute of undergrowth. It was in the damp hollows, and near the streams, or under the shade of some high rock, that the shrubs and herbaceous plants were rank.

In the forest or drier parts of the jungle, the following trees formed a great part of the vegetation. *Dillenia aurea*, and *D. speciosa*, the fruit of both of which is eaten by the Burmese and Karens in their curries, or rather boiled mixtures, on account of the enlarged permanent fleshy calyx, *Careya arborea*, *Lagerstræmia Reginæ*, and probably two or three other species, one being abundant, which had knotty protuberances on the trunk, which I had not noticed before on *Lagerstræmias*. These nodes were frequently so sharp as to offer serious obstacles to those who climb with naked feet. *Bignonia stipulata*, *B. crispa*, and others were also common. I do not recollect to have noticed *B. (Spathodea) Indica*, which is frequent about Moulmein. I also observed *Pterocarpus Indicus*, *Dipterocarpus lœvis*, and *Hopea odorata*, the two last of which become scarcer as the soil becomes more shallow and rocky, several species of *Dalbergia*, *Inga xylocarpa*, *Acacia elata* (?) and huge fig trees. The teak (*Tectona grandis*) was very local, and only small trees are now left standing, but these in considerable abundance. *Gordonia floribunda* which in the neighbourhood of Moulmein and Tavoy is a common tree was here very rare. Two or three species of *Sterculia*, form large trees, *Vitex arborea* and *V. alata*, *Erythrina Indica*, *E. stricta*, *Nauclea*, *Terminalia* and others, several species of *Bauhinia*; *Pterospermum semisagittatum*, and *Pt. lanceæfolium*.

Besides these, two of the most abundant and remarkable trees were those called by the Burmese *Tamanay*, and *Myouk Kyan*. The former (*Gmelina arborea*) is a tree of middle size (fifty to sixty feet) with a diameter of perhaps two to two half feet, a rather short trunk, and singular meazly bark, covered with depressed scar-like spots, by which the tree is at once recognized. It was in full flower, and the ground was strewed with the fallen *Corollas* every morning. I have good dried specimens of it. The latter, *Myouk-kyaw*, *Homalium tomentosum*, meaning the monkey slipping tree, is so called, because not even a monkey can climb it. This peculiarity arises from the smooth lively green bark being covered with a white pulverulent substance, which comes off upon the hands, when an attempt is made to grasp the trunk; so that neither man nor monkey can succeed in climbing it. For the same reason, *epiphytes* cannot attach themselves to this tree. Not an orchid, nor a moss, nor so much as a lichen, is ever seen upon it, unless by chance a plant becomes lodged in a fork, which I once only noticed in the case of a bunch of *Cymbidium aloifolium*. The tree is tall, about eighty feet high, with a diameter of not more than eighteen inches, or, at the most, two feet, and has a straight trunk, destitute of brauches up to a considerable height. The foliage is scanty. Mr. Mason, in his book on the Natural Productions of Burmah calls it "Teuasserim Lancewood" and thinks it is a species of *Dalbergia*, but the leaves are simple and alternate, not pinnate or compound. The udergrowth, in these jungles, where abundant, consists in great part of the following: *Euphorbiaceæ* (this order is largely prevalent); *Randia*, *Gardenia*, *Ixora*, *Morinda*, *Pavetta Indica*, *Mussaenda Wallichii*, and other *Cinchonaceæ*; *Connarus*, *Poivrea*, *Combretum*, *Unona*, *Uvaria*, *Melastoma Malabathricum*, *Memecylon ramiflorum*, *Leea*, *Helicteres*, *Ardisia villosa*, and *A. umbellata*, *Clerodendron nutans*, and *infortunatum*; *Barringtonia acutangula*, *Erythroxylon laurifolium*, *Urtica*, *Hibiscus*, &c. The most strikingly abundant of these are *Mussaenda Wallichii*, *Melastoma Malabathricum*, and *Clerodendron infortunatum*.

The herbaceous plants are mostly gregarious *Acanthaceæ* in the dry and hilly parts, and *Zingiberaceæ* in the damp valleys. One large species *Zingiber squarrosum* (?) is the most abundant of these.

Of annuals, at this dry season, none were visible. In the swamps and dark hollows, the vegetation is peculiarly tropical in appearance. In such places grow various species of *Calamus*, *Corypha Taliera* (?), *Licuala peltata* ?, *Zalacca edulis*, *Caryota urens* ?, *Wallichia caryotoides*, *Areca*, *Pandanus*, *Arum odoratum*, *Colocasia antiquorum*, *Pothos scandens*, *P. Lasia*, *P. gigantea*, *Scindapsus officinalis*, and *S. pinnatifida*. Ferns too rejoice in such localities: for here flourish *Goniopteris lineata*, *Angiopteris crassipes*, *Dictyopteris macrodonta*, *Sagenia hippocrepis*, *Pteris longipinnula*, and other species. These grow on the ground, while *Lomaria scandens* and *Leptochilus axillaris* (the former especially) climb to the tops of the trees, and add much to the denseness of the foliage and to the gloominess of such spots.

In waste places, near the sites of deserted villages, the "rude-*rales*" are *Sida acuta*, *Urena lobata*, (both these used for cordage in Moulmein), *Leucas Zeylanica*, *Gendarussa adhatoda*, *Blumea grandis*, *Cyanotis* (Sp. ?), *Momordica mixta*, and other species, *Ipomoea vitifolia*, and others.

Among the orchids collected on this journey, I may just mention *Vanda gigantea*, of which plant, though only once met with on this occasion, there was more in one mass, than could be conveniently packed away on an elephant. It was indeed a most wonderful aerial growth. The *Dendrobes* were *D. Dalhousianum*, *D. Pierardii*, *D. Aggregatum*, *D. formosum*, *D. clavatum*, *D. teres*, *D. moniliforme* (?), and two more handsome species with large orange-coloured flowers, whose names are not known to me. I observed also *Saccolabium guttatum*, *Aerides cornutum*, a fine species allied to *A. affine*, *Cymbidium aloifolium*, two or three species of *Oberonia*, a very handsome species of *Limatodes*, one species of *Cirrhopetalum*, and two species of *Cypripedium*, one with very large flowers. These were nearly all in flower. Besides these, many kinds of small orchids were collected. I must not forget to add one other. (*Cyrtosiae* species ?) a singular leafless plant, which I met with only once. Its roots (few and fleshy) were in the ground, and its stem, which was of the thickness of a small cane, was thirty feet in length! The place of leaves was supplied by fleshy stipulate bodies, which were alternate, having an aerial root opposite each one, by which

it attached itself to a tree and scrambled among its branches. The flowers were numerous, at the end of the branched stem in loose panicles, rather large, boat-shaped, yellow. The whole plant has been sent to Sir William Hooker for determination with many other things.

Of other *epiphytes*, there were various kinds of *Aeschynanthus*, *Hoya*, and *Hedychium*. The most frequent creepers or climbing plants, were *Butea superba*, *Congea velutina*, and *Thunbergia laurifolia*. These three may be said to be ubiquitous. It is extremely remarkable that the last-named plant should have remained, until so very lately, undescribed, when we consider that several Botanists have visited our jungles, that it is almost impossible to walk two or three miles in any part of the Provinces without meeting with it, and that it is in flower nearly all the year round. The beauty of the jungles was much increased by these three fine creepers, as they were all in full flower at this time. A species of *Pongamia*, with small purple flowers, is a great ornament also. A large thorny *Mimosa* is common, *Paratropia digitata* occasionally occurs, and a species of *Clematis*, also different kinds of *Asclepiadaceae*, *Bauhinia*, *Dioscorea*, *Momordica*, *Cucurbita*, *Ipomoea*, *Mucuna*, &c.

The ferns gathered, or noticed, besides those mentioned above, were *Drynaria quercifolia*, *D. irioides*, *Alsophila gigantea*? *Asplenium nitidum*, *Neottopteris nidus*, *Digrammaria esculenta*, *Drymoglossum piloselloides*, *Polybotrya setosa*, *Nephrodium molle*, *Lygodium scandens*, *Pteris pellucida*, *Pt. biaurita*, *Pt. aquilina*, *Adiantum Capillus Veneris*, *Trichomanes Javanicum*, *Schizoloma ensifolia*, *Platycerium Wallichii*, *Ophioglossum pendulum* and others. *Drynaria quercifolia* strange to say, was never seen in the hilly district of the Siamese Shan States, but its place was there supplied by *D. Coronans*, which in like manner, was entirely absent from the plains. With the *Alsophila* I am puzzled. *A. gigantea* is said to grow fifty feet high, and the Tenasserim Mountains are given as one of its habitats. I have seen something of the Tenasserim jungles and hundreds of this plant (specimens of which sent to Sir W. Hooker have been named *A. gigantea*) but never one with a true caudex or one that could be fairly called a tree fern. It is generally from five to six feet high only, the fronds themselves being that length. I have, however,

seen one plant, though only one, with a *pseudocaudex*, such as *Lastraea filix mas* and *dilatata* occasionally have at home, about 18 inches long. It is one of the commonest of our ferns, and it is strange, that if it does ever attain the height given, I should never have seen one at all approaching to it. I am disposed to think that there are no tree ferns in the Provinces. Those ferns, whose habitats are trunks of trees, were dried up, such for instance as some of the genus *Davallia*, otherwise the list would have been much larger.

Of *Lycopodia*, I met with two species, both pendulous; *Lycopodium Phlegmaria*, and *L. ulicifolium*. Of *Selaginella*, two species, I think, *S. Willdenovii* and *S. flabellata*. These were not in our territory, but in the district of Kiouk-Koung. They do, however, grow within our Provinces.

*Mosses* are scarce in Burmah. Of terrestrial branched kinds like our beautiful *Hypna*, there are none, or scarcely any, and those on trees are few, and nowhere in abundance. The only moss which I have seen growing with anything like the luxuriance of those in temperate climates, is *Meteoriump squarrosum*, which, in damp dark jungles, hangs gracefully from the small branches of the underwood to the length of six or eight inches. This species, with *Octoblepharis albida* and *serrata*, *Leucoloma Taylori*, *Funaria hygrometrica*, and half a dozen others (barren) constitute my whole collection of mosses made on this occasion.

I have already alluded to the magnificent limestone rocks, at the foot of which our path frequently lay. They are a striking feature in the scenery of this part of the provinces. They have a general course S. E. and N. W., and though now broken up into detached masses and often separated by many miles, were plainly, at one time, continuous. At *Thonzoo* (*the three Pagodas*) a distance of some ninety miles, as the crow flies, from Moulmein, we seemed to have reached nearly the last of these remarkable rocks, though not the end of the limestone formation. The site of the (so-called) three Pagodas (really nothing more than three heaps of stones raised to mark our boundary in this direction) is nearly as rugged as the top of one of them, worn away as the summits of all of them are into needle-like points; the rocks protruding through the

scanty soil in all directions, in large masses. The plants consequently growing at this spot, are for the most part, the same as those which are found on similar rocks near to and even north of Monlmein, and which are not found anywhere but on these rocks. Such are *Cycas circinalis*, two species of *Dracæna*, and what I take to be a species of *Caralluma*, though I have never seen the flower. Near Monlmein, one would have to climb the rocks to a considerable height to find these plants, while here they are gathered without climbing, the general rise of the country being about equivalent to the height at which they grow there.

This is a most interesting spot to a Botanist, abounding with a number of curious plants, and well deserving a longer stay than we could afford, only two or three hours. A want of water for men and elephants, in the dry season, makes it necessary to push on beyond it. A profusion of orchids grow on the rocks, and on the small stunted trees (chiefly *Eugenias*) that cover the rocks. I gathered here the first *Cypripedium* I had met with in the country, *Dendrobium clavatum*, *D. formosum*, *D. teres* in abundance, also two or three other terete-leaved orchids of different genera, one a *Cymbidium*, and one I think an *Aerides*, with a number of smaller sorts.

*Thonzoo* is a wild desolate spot, with more of open country about it, than we had as yet seen. The jungle is thin, composed chiefly of *Dillenia*, *Careya*, *Erythrina*, *Eugenia*, and a species of *Dipterocarpus*, all of which are stunted and weather-beaten from exposure to the S. W. Monsoon, to the full force of which this spot is open. The few plants mentioned as gathered here all grow within the space of a few hundred yards. I had no time for more than the most cursory examination of this place, and this was done at mid-day, when the heat of the sun reflected from the rocks was intense. Judging from what I gathered in the time, and from the numerous dried remains of herbaceous plants, I fancy that a rich harvest would be reaped here by a Botanist, who should visit it during the rainy season, or immediately after its close. *Cyperaceæ* appeared especially numerous, and other bog plants would probably be found in abundance, as I noticed here (for the first time in the provinces) patches of genuine black spongy peat-soil in the hollows, which still retained moisture; no trace, however, of *Sphagnum* could be detected.

Leaving *Thonzoo* we entered the Siamese State of "Kiouk-Konng," and our course lay at first Eastward, then Northward and Eastward, until, in seven days, we again reached our boundary on the Honngdrau river. The country crossed in the interim consists of a mass of limestone hills, whose height averages 2-3000 feet, clothed from top to bottom with the densest jungle. Although apparently of the same geological formation as the perpendicular rocks before mentioned, they have a rounded outline, and are covered with a rich clayey soil, in some places of considerable depth, the colour of the clay varying from red to yellow.

Unless I am altogether mistaken in considering the rocks to be geologically identical, it appears strange that two contiguous portions of the same formation should have so strikingly different an outward character; the one, that of interrupted chains of rock with perpendicular faces, and singularly rugged and fantastic outline: and the other, that of an ordinary mountainous district of alternating valleys and hills. It appears difficult to understand how one portion could have been subjected to eruptive forces from beneath, which would not have equally affected the other, seeing that they are so close, some of the abrupt rocks actually running into the valleys of (what I call) the hilly portion!

The difference, however, in the direction of the strata may perhaps be one cause of the marked difference in their form; for, whereas in the perpendicular rocks (as seen near Monlmein) the strata dip at a considerable angle to the Eastward, in the hilly district of Kionk-Koung they are horizontal or nearly so; and I imagine that those rocks which present their edges to the action of the weather, are more liable to be worn into a rugged outline than those whose strata are horizontally disposed.

It was sufficiently easy to observe the disposition of the strata, as the beds of the hill streams form, generally, the only practicable, path across this wild district; and, in these water-courses, the streams fall over a series of regular steps, formed by perfectly flat slabs of rock overlying each other horizontally; these slabs being often from ten to twenty feet broad, and two or three feet thick. And that they are Limestone was shown by the fact that small *stalactites* were of frequent occurrence on the perpendicular faces of the steps

where the stone was hollowed out underneath. In making these remarks, I do not affect any acquaintance with Geology, I only note what I observed.

I was struck with the wonderful luxuriance of the vegetation of this district. It surpassed anything I had seen within our boundary. At the first village, Waytamarraig, where we halted, it was particularly remarkable. This village lies in a valley enclosed by hills on all sides, and has an elevation above Moulmein of some five hundred feet. A small stream called "*Thoung Kaliya*" runs through it, whose waters flowing S. E. eventually fall into the *Menam*. At this place the rankness of the vegetation, even at this dry season, was surprising. All the plants previously mentioned as growing in damp shady spots grew here, and with increased luxuriance. The jungle was impenetrable from the abundance of various species of *Bambusa*, *Calamus*, *Zalacca*, *Licuala*, *Corypha*, *Caryota*, &c.

The trunks of the large trees were clothed to the top with Aroideæ, or the frequent *Lomaria scandens*. Almost every available fork had *Neottopteris nidus* seated in it, the fronds of which were six feet long; while different species of *Hoya*, *Aeschynanthus*, *Hedychium*, and the larger *Orchideæ*, loaded and festooned the boughs. The undershrubs were covered with small *Orchideæ*, the pendulous *Meteorium squarrosum*, and *Jungermanniæ*; and the ground, was, in many parts, knee-deep in beautiful *Selaginellæ*. Two *epiphytes*, seen here, struck me as new: one, a very graceful *Aeschynanthus*, with small ovato lanceolate leaves, and pretty pinkish flowers, which hung down from the branches, to the length of three or four feet: the other, a small erect species of *Peperomia*. I found too a small *Tetranthera* here, which I had never seen before.

But that which delighted me most, was a very beautiful tree of middle size in full flower which had not occurred before. I cannot describe it better, in a general way, than by saying that it exceedingly resembles the common Horsechesnut. No one could see it without being at once struck with the resemblance. It is a dense umbrageous tree, about forty feet high. On examination, my surprise equalled my delight; as it proved to be a true *Aesculus*.\*

\* Mr. Parish's horsechesnut is *Aesculus Punduana*, Wall. It extends from the Khasia mountains along the tropical belt of the Himalaya as far west as Sikkim and specimens of it occur among Dr. Falconer's Moulmein Collections. T. T.

The leaves are opposite, palmate, with seven leaflets. The *inflorescence* is a terminal, erect, rigid panicle about eighteen inches high. The *flowers* appear to be dioecious for I could find no trace of a germ in any which I gathered. The *Calyx* is tubular, 5-parted, irregular. The *petals* are four, a fifth being wanting in front. Their colour is white, the two upper ones being beautifully tinged with red and yellow. The *stamens* are seven, long, filiform. The *anthers* are versatile, 2-lobed, opening longitudinally. My dried specimens are fortunately excellent, and the flowers have preserved their colours perfectly. They will shortly be sent to Sir W. Hooker.

The vegetation in the low valleys of this district is such as I have attempted to describe. That on the hills is mainly composed of *Bambusa gigantea* (Burm. *Wa-bo*,) with large trees interspersed, mostly of the genera before named, with the addition, however, of many, which I regret that my limited acquaintance with the forest trees, prevents me from specifying. Perhaps the most abundant trees are *Dillenia* and *Gmelina arborea*. *Hopca*, and *Dipterocarpus* still occur, but scantily; nor do they attain the gigantic proportions which they reach in the lower lands. Two very useful cordage plants appear to be plentiful; one is *Hibiscus macrophyllus* and the other a *Sterculia*. An excellent rope of great strength is made of these materials by the Burmese and Karens in a few minutes. The undergrowth on these hills is chiefly made up of *Cinchonaceæ*, and gregarious *Acanthaceæ*. In the rainy season the ground would be covered with *Zingiberaceæ*, the decayed leaves of which were seen every where. Nearly the only species that remains green in the hot season is the before mentioned *Zingiber squarrosum*, the fine broad leaves of which form a conspicuous feature in all the damp shady hollows. I must not forget to mention that the beautiful *Thunbergia laurifolia*, never left us for a day even here, scarcely for an hour, so universal is it in this part of the world. In the higher valleys that fine sombre Palm, *Arenga saccharifera* (*Saguerus Rumphii Roxb.*) is abundant. Although, according to Seemann, this Palm is applicable to so many domestic purposes (yielding toddy, sugar, and sago, besides a valuable substance for cordage in the strong fibres about the base of the petioles,) I am not aware that it is put to any single use whatever by the natives here. The

same Palm grows also in our Provinces on the hills that lie between *Kankareet* and the *Thoungyeen* river.

On an extensive tableland, with an elevation of about two thousand feet, which we crossed, I think on the third day after leaving "Thonzoo," the vegetation was almost as rank as in the low valleys. We passed through a great deal of tall grass. Bamboos were plentiful, and the prevailing trees still *Dillenias* and *Gmelina arborea* with large *Sterculias*. Here also grew abundantly a fine *Pandanus*; it had no aerial roots, but shot up perfectly straight for some thirty or forty feet, and then branched once or twice dichotomously. The leaves drooped as in other species. The extent of this tableland was considerable, giving an area, I should say, of several square miles. The soil was evidently rich, and the high hills which surround it on all sides, supply it abundantly with water. If the approach to it were only more practicable, it would offer a fine, as well as most picturesque site for a settlement.

On the third or fourth day after leaving Thonzoo, we arrived about sunset, after a long march, over very steep hills, at an unusually romantic spot; at least, so it appeared to us. Perhaps, however, the great charm was that we here emerged for awhile from the jungle and could see a mile or so before us. A small extent of country suddenly opened upon us clear of jungle. The only vegetation was long grass, recently burned, with *Pteris aquilina*, and here and there a *Dillenia*, and the ever-recurring *Tamanay* *Gmelia*. Snugly ensconced in a hollow lay a Siamese village of a few houses, reminding us at once of a Swiss Chalet. This effect is produced by the form of the houses which have low pitched roofs and widely projecting eaves, also by their generally rustic character. The *Wa-bo* (*Bambusa gigantea*) forms the whole material for house-building. Whole bamboos furnish the posts; portions of the same, split and interlaced in various ways, the sides and floors, which according to the universal custom here and throughout Burmah, are raised some six or seven feet from the ground, while the roof is composed of long lengths of half bamboos, with their concave and convex sides alternately uppermost, and overlying each other after the manner of rounded tiles. The name of the village is *Loon-t'he-Koung*. The clearing, though extensive, was, no doubt, artificial,

since the higher hills all round were covered with the usual thick jungle. It is strange how *Pteris aquilina* should find its way to such a clearing, and at once establish itself! The elevation is about 2000 (1919) feet above Moulmein. The Thermometer, just before sunrise on the 17th or 18th of February, stood at 52°, a temperature which sensibly affects those who have been walking, but a few hours before, in a noonday sun, and a temperature of 120°. On an adjoining hill about 500 feet higher, stood a tall solitary specimen (apparently) of *Borassus*. I could not approach it for the jungle, but there can be little doubt but that it was wild, as that hill had never been cleared. Besides which the Karens cultivate no Palms whatever and the Burmese gave it the name of *Tau-tan* or wild Palm. A small stream, rising in the higher hills, flows near this village; and on its banks the same *Salix*, which, fringes our river sides, at or near the level of the sea, in the form of a mere bush, is seen growing to a large tree having a height of some forty feet, with a diameter of 18 inches. Besides the *Salix*, the three most prevalent trees, by all the hill streams, were the *Aesculus* before mentioned, *Meliosma (Millingtonia Roxb.) simplicifolia*, and a very fine large-leaved, large-flowered *Eugenia (E. aqurea? Roxb.)* We have, then, at this place, with an elevation above the sea-level of some 2000 feet, *Aesculus*, *Salix*, and *Pteris aquilina*, growing in company with *Borassus*, *Dillenia*, *Dipterocarpus*, *Pandanus* and other tropical forms. I may mention that I found *Pt. aquilina* growing on as low a level as 1000 feet above the sea in this district, also *Funaria hygrometrica*. At about the same level I gathered also *Adiantum Capillus Veneris*, on rocks in the *Megatha* river.

The Karens, who inhabit this wild district, are few, and their villages many miles from each other. They live entirely on vegetables, and have no domestic animal but the dog. Though their jungles abound with wild fowl, they keep no poultry. The purchase of eggs or milk, of anything indeed, but rice, is, therefore, hopeless. Their cultivation is of the rudest kind, a fresh clearing being made every year for their rice-crop, which is their chief food. Besides rice they grow, however, tobacco, sesamum, cotton, sugar-cane, and chillies. They seem fond of flowers, for a quantity of

marigolds were growing in the paddy clearings, also a small yellow everlasting flower, and occasionally I noticed a patch of the red plumbago.

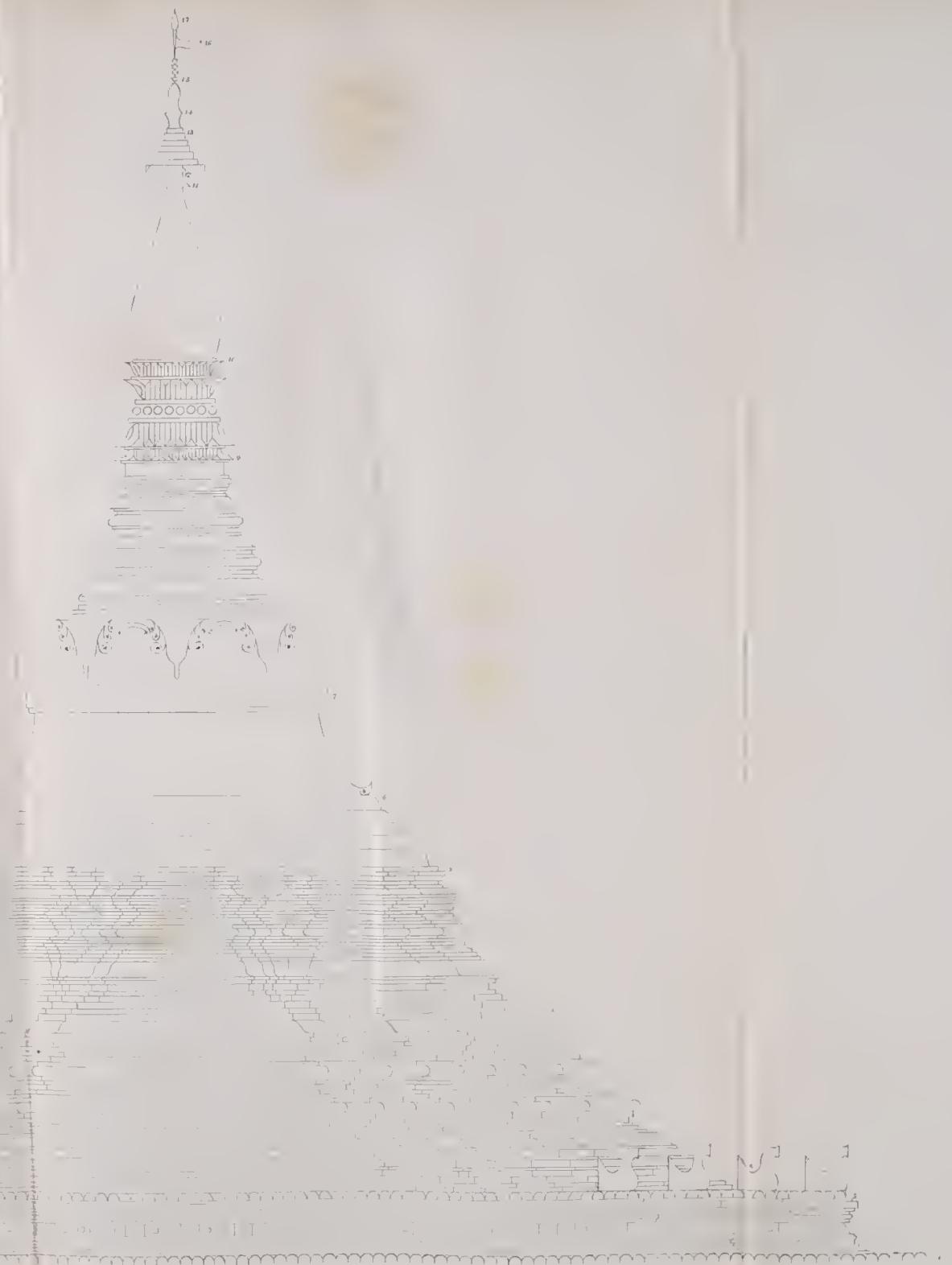
On descending again into the plain, there was a daily repetition of the plants already specified. The only trees not noticed before were *Jonesia*, *Citrus*, *Panax*, and a *Cinnamomum*, to which I may add a fine species of “*Calanthe*” and one of that curious order *Cytinaceæ*.

We struck the Houngrau river at Meetan on the 22nd day after leaving Moulmein, thence dropped down the river to a place called *Kyik*, from which lies the path leading to the top of *Moolee-it*, a mountain according to Major Tickell's measurement some 7000 feet in height. My chief object in undertaking this journey was to make the ascent of this mountain; but it was not my good fortune to do so. I here left Major Tickell, and dropping down the river in a light canoe, reached Moulmein in two days.

*Note by Dr. T. Thomson.*

Excellent specimens collected by Mr. Parish have enabled me (at his request) to introduce into this most interesting account of the vegetation of the Attaran river, the names of the *Homalium Aesculus* and *Gmelina*. I am further responsible for the name *Duabangha* which I know from the Wallichian Herbarium to be a native of the province, and which I think I can recognize beyond mistake in Mr. Parish's description. I can suggest no other alterations save that the *Padouk* of Pegu and Tenasserim is, I believe, rather *Pterocarpus dulbergioides* than *P. indica* as stated in the text, and that the tree with light birch-like foliage mentioned at page 460 is probably *Conocarpus acuminata*.





ELEVATION OF  
THE  
SHWE DAGON PAGODA

AT  
RANGOON.

*On the History of the Shwe Dagon Pagoda at Rangoon.—By Lieut.-Col. A. P. PHAYRE, Commissioner of Pegu and Agent to the Governor-General of India.*

The great Pagoda at Rangoon, known as the Shwe Dagon or Golden Dagon is the most celebrated object of worship in all the Indo-Chinese countries. Like most Boodhist pagodas in Burmah it is simply a solid mass of masonry. But this building derives its peculiar sanctity, from having enclosed in its interior shrine, below the surface of the ground on which it stands, relics of the last Boodha Gautama, and personal implements or garments used by the three preceding Boodhas.

The legend of the first building of the Shwe Dagon pagoda dates from a very early period in the history of the Mon or Talaing race. Before the birth of Gautama, a King reigned over the Talaings in the Delta of the Irrawaddy at a city called Okkalaba.\* The site of the city so named was originally at a spot now known as Twantay, situated about sixteen miles West from Rangoon. Near that city lived a pious merchant named Tha-ka-lai and his wife Tha-ta-bhan. On account of his worthiness, and by virtue of his former works of merit, he received a title and high distinction from the King of the country. He had two sons named Pa-oo and Tapau. The first signifies in the Mon language *dove*, the second *plenty*; both names being derived from gifts and alms offered and bestowed by their parents at the birth of these children. The two young men having heard that a famine existed in the Western countries, determined

\* It is curious to observe how remote and obscure traditions linger among semi-civilized races and influence their present actions. In the autumn of 1858 a poor fisherman near Twantay, having dragged up in his net from a stream a small image of Boodha, believed this to be an omen of his high destiny. In accordance with Boodhist principles he believed he would rise in the scale of being, restore the Talaing kingdom, and revive religion.

A few desperate characters, willing to profit by his fanaticism, gathered round him. They took possession of the town, issued proclamations, and were proceeding to the temple to inaugurate the fisherman in his new calling, when they were stopped in their career, and all arrested. The fisherman escaped for the time, but was given up by the villagers the same night.

to convey there a ship-load of rice, to distribute among the people. They sailed, and in due time cast anchor on the coast of the country, which it is presumed was the shore at the mouths of the Ganges. From thence they proceeded, one day's journey to the city of Ban-da-wa.\* They hired there five hundred carts; returned with them to the ship; loaded the carts with rice, and proceeded again towards the city. What next befel them is thus narrated in the chronicles of the Pagoda:—

“ As the brothers went on, she who in a former state of existence had been their mother, now the guardian Nât of a tree, asked of them, ‘ Whither go ye to buy and sell?’ They replied, ‘ We go to the city of Ban-da-wa.’ The Nât said, ‘ Desire ye gold and silver merchandize, or rather desire ye heavenly treasure?’ The brothers replied, ‘ We desire heavenly treasure.’ The Nât answered, ‘ If that be true, then go ye to the place where the Lord is.’ ”

Guided by the Nât for several days the two brothers reached the place where Gautama then was. The date of their arrival is said to have been Wednesday, the 13th day of the waning moon Wa-khoun in the year 103.†

The interview of the brothers with the Boodha Gautama is recorded in the life of the philosopher, which has been translated and illustrated with a luminous commentary by the Right Reverend Bishop Bigandet, Vicar Apostolic in Ava and Pegu.

The following is the passage in Chapter V. of the Bishop's translation :

“ At that time‡ two brothers named Tapoosa and Palakat, merchants by profession were going with their carts from the village of Oo-kala to the country of Mit-zi-ma where Phra was then residing. A Nât who had been formerly their relative, stopped by his power the wheels of the carriages. Surprised at such a wonder, the mer-

\* The only place now in Bengal which I know with a name similar to this city, is Pundooa in the district of Hoogly.

† This date is 103 of the era established by king Thee-ha-noo, the grandfather of Gautama. It is equivalent to B. C. 588, or 45 years before Gautama entered Neib-ban.

‡ At this time Gautama is stated to have been a short distance West of *Bau-di-beng* or the sacred tree of Budh Gaya.

chants prayed to the Nât gnardian of that place. The Nât assuming a visible shape appeared before them and said to them, "The illustrious Boodha who, by the knowledge of the four great truths has arrived to the nature of Phura, is now sitting at the foot of the Linloon tree ; go now to that place and offer him some sweet bread and honey ; you shall derive therefrom great merits for many days and nights to come." The two brothers joyfully complying with the Nât's request, prepared the sweet bread and honey, and hastened in the direction that had been indicated to them. Having placed themselves in a suitable position and prostrated before Boodha, they said ; Most glorious Phra, please to accept these offerings ; great merits, doubtless, will be our reward for many days to come. Boodha had no patta to put those offerings in, for the one he had received from the Brahma Gatigara had disappeared, when Thoodzata made him her great offerings. Whilst he was thinking on what he had to do, four Nâts came and presented him each with one patta, made of nila stone. Phra accepted the four pattas, not from motives of covetousness, but to let each Nât have an equal share in such meritorious work. He put the four pattas one in the other, and by the power of his will, they on a sudden became but one patta, so that each Nât lost nothing of the merit of his offerings. Boodha received the offerings of the two merchants in that patta and satisfied his appetite. The two brothers said to Boodha, " We have on this day approached you, worshipped you and respectfully listened to your instrnctions—please to consider us as your devoted followers for the remainder of our life." They obtained the position of Upa-tha-ka. They continued addressing Boodha and said, " What shall we henceforth worship ?" Boodha, rubbing his hand over his head gave them a few of his hairs that had adhered to his fingers, bidding them to keep carefully those reliques. The two brothers, overjoyed at such a valuable present, most respectfully received it, prostrated before Boodha and departed."

In the history of the Shwe Dagon Pagoda, this interview of the merchants' sons with Gautama, is expanded into a more particular narrative, to connect it with the fortunes of Pegr. The young men in reply to Gantama, state that they come from a far and obscure country, and the Lord Gautama reveals to them that his predeces-

sors the former Boodhas, had left in Pegu a bathing garment, a water dipper and a staff, hid in the Thein-goot-ta-ya Mount, under a wood-oil tree. Then giving four of the hairs of his head to each of the brothers, one of them he named Ta-poo-sa and the other Pha-le-ka, and charged them to deposit those hairs with the relics of the former Boodhas.

The two brothers then set out on their return, joined their ship at Ban-da-wa and sailed towards their own country. On the way they enter a port called D-ze-ta or E-za-ta,\* the King of which appropriates two of the hairs. They proceed on and cast anchor at Cape Negrais,† the Naga or Dragon of which, also demands two of the hairs. These are reluctantly yielded ; after which, the brothers continue their voyage, and reach Oo-ka-la-ba in seven days. The eight hairs bestowed by Gautama are then found complete in the golden casket, in which they had from the first been deposited by the brothers.

The father and mother of the young men rejoiced exceedingly, saying, "Our children have indeed returned with heavenly treasure," and represented all that had occurred to the king of Oo-ka-la-ba.

The King with his Queen and nobles with the merchant, his wife and children proceeded to where the ship was, and received the relics with due honour. But no one could point out where Mount Thein-goot-taya was situated. At length the Guardian Nât of the Earth appears, and with his assistance the Mount is discovered, and the tree under which the former relics were deposited, was felled.

"Then the tree, (so proceeds the legend), as the three divisions of the Mount were not equal in height, remained poised horizontally on its centre on the highest peak ; its top touched not the

\* These names cannot be recognized.

† The word Negrais has been adopted into European Geography through the old Portuguese voyagers. It no doubt is a corruption of the Burmese word "Naga-nheet" or "Naga-rect," as by the Burmese tradition the Naga, or Sea Dragon, there lies in wait to sink the ships of those unbelieving voyagers who pay him no respect.

ground, and its root touched not the ground. Therefore the place was called in the Mwon language 'Dagon.' \*\*

A shrine or relic chamber was then prepared under-ground, to receive the sacred reliques, which were deposited therein with great ceremony, by the Nâts, the King, the Merchant Tha-ka-lai, now surnamed Thoo-wan-ná, and the inhabitants of the country. Numerous valuables, gold, silver and precious stones were also deposited in the relic chamber, and the golden model of a ship, with the two brothers holding the helm, floated miraculously, on a mimic sea. A small pagoda, not exceeding eighteen enbits in height, was then erected over the relique. The city then founded on the ground around the present pagoda, was called Oo-ka-la-ba. This is the first account of a place of worship being erected on the site of the present Shwé Dagon. The date of this event is stated to be 103 of the era established by Gantama's grandfather, or B.C. 588.

The dynasty of this Sovereign of Oo-ka-la-ba ceased after thirty-two generations, and the city of Oo-ka-la-ba and the Shwé Dagon Pagoda fell to ruins.

\* Much doubt has existed regarding the origin and meaning of the word *Dagon* as applied by the Burmese to the Great Pagoda at Rangoon. It has been supposed to be a corruption of the Pali word *Dagoba* from whence the European *Pagoda*, is, by transposition of the syllables derived. Several other supposed etymologies might be mentioned; but the name appears to be most probably derived from a word in the *Mon* or *Talaing* language. The obscurity in the meaning has resulted from that language having become nearly extinct in Pegu and from the Burmese authors of histories of the temple, seldom being acquainted with that language. The tree mentioned in the text appears according to the Talaing legend to have fallen "Tagún" or "Takún," that is *athwart* or across the hill, and to have been sustained horizontally in that position. The term *Tagún*, though strictly applicable to the object so placed across the hill, appears afterwards to have been used to designate the spot itself; and also the Pagoda built upon it, in commemoration of this remarkable event. The word has been changed by the Burmese into "Dagou" or "Dagún." The word *Shwé*, meaning Golden, is a translation of the original Talaing word prefixed to "Ta-gún." It is now used as a term indicative of excellence and respect.

The tree being sustained by the hill in the position mentioned was probably deemed to mark the original spot where the reliques of former Boodhas had been deposited, and to indicate the destined site for the new Pagoda.

Subsequently in the year 514\* Tha-ma-la and Wee-ma-la, two brothers built a city and called it Han-tha-wa-tee. Their dynasty became extinct after twenty-seven generations and the city was abandoned. The city of Martaban was then built, and after seven generations the city of Han-tha-wa-tee was rebuilt. It was not until the reign of Bau-gya-ran in the year 808,† that anything was done to restore the Shwé Dagon Pagoda. The work was continued by his successors and in the Burmese year 863‡ a female Sovereign Sheng-tsau-boo, having succeeded to the throne, land was set apart, and hereditary servitors were appointed for the perpetual service of the temple.

At this time the height of the pagoda is stated to have been 86 cubits or 129 feet.

It cannot be credited that during the life of Gautama the Talaing people had through their own means, any communication by sea with India; or that Buddhism was introduced into the delta of the Irrawaddy at so early a period. The first building of a pagoda, on the site of the present Shwé Dagon, cannot from the Talaiug or Burmese histories be fixed with certainty. Indeed the first reliable accounts connected with the pagoda in native history, are those which relate to occurrences in the reign of the Queen Sheng-tsau-boo, so late as the beginning of the sixteenth century of the Christian era. Since then the pagoda has from time to time been enlarged, and probably did not assume the beautiful form it now presents, springing majestically up to the height of 320 feet, until the reign of Tshen-phyoo Sheng, the son of Alompra. It is certain that in that King's reign the present *Htee* or spire was placed on the pagoda, about the Burmese year 1130 or A. D. 1768. Pegu the ancient capital of the Talaing kingdom being abandoned, after the conquest of the country by the Burmese under Alompra, it became the policy of the Burmese Kings to increase the splendour of the

\* This era is believed to be the era of religion established from the death of Gautama; 514 will therefore be the year 29 B.C. Han-tha-wa-tee is the old city of Pegu. It received its name from two birds Han-tha or Han-za being seen at the spot selected for the city. The Han-za thence became the emblem or standard of the kingdom of Pegu.

† A.D. 1446.

‡ A.D. 1501.

pagoda at Rangoon, so that it might surpass the ancient temple where the Talaings had for so many ages worshipped, and which was associated with recollections of their national independence. This no doubt prompted the Burmese to add to the size and beauty of the original building at Rangoon, and give it a Burmese form.

In the travels of the well known Mendes Pinto about the year 1545, he speaks of the city or port of Dagon, which no doubt refers to a city at or near, the present site of Rangoon. He makes no mention of the pagoda which he could scarcely have failed to do had it been of the size of the present building. The pagoda however appears to be mentioned by Gasparo Balbi a Venetian in 1583.

In concluding this notice of Shwé Dagon Pagoda, I purpose adding a few words on similar buildings in Burmah generally. They may be arranged into four classes, as follows :

1st. *Dat-dau Tsédee* or those containing relics of a Boodha or Rahanda.

2nd. *Pa-ree-bau-ga Tsé-dee* or those containing implements or garments which have belonged to Boodhas or sacred personages.

3rd. *Dhamma Tsé-dee*, or those containing sacred books or scrolls with texts.

4th. *Oo-deit-tsa Tsé-dee* or those built from motives of piety, and containing images of Boodha or models of sacred buildings generally in precious metal.

Hence in Burmah a pagoda is worshipped as being the depository of a relic; a monument to Boodha; or as representing *Dhammá* that is Divine Law.

The form of the most ancient pagodas in India appears to have been hemispherical, an expanded umbrella wrought in stone, being generally placed at the summit. Such was probably the shape of the original Shwé Dagon. Gradually however the form has been altered in Burmah, until the normal shape of a modern pagoda has become that of a cone, or circular pyramid of solid brick work, more or less ornamented, and crowned by a tapering spire of gilt iron cast work. This is called the *htee* or umbrella.

The accompanying elevation of the Shwé Dagon Pagoda, exhibits the outline of that building and appended thereto are the terms used by the Burmese to designate the several parts of the fabric.

*Names used to designate the several parts of the building.*

Reference numbers in the elevation.	Burmese name.	Translation.	Remarks.
1	Bhe-nat dau.	Sandal, being the base or plinth.	
2 to 3	Pa-leng Khon or Pan-ten-gon or Pa-tamá pits-tsa-ya.	Throne or pedestal ; flower-stand or first gradation.	The name flower-stand or reeptacle is given, because the offerings of flowers are frequently laid upon this part.
3 to 4	Doo-te-ya pits-tsa-ya.	Second gradation or story.	
4 to 5	Tá-te-yá pits-tsa-ya.	Third gradation or story.	
5 to 6	Kyé-waing.	Circular frame.	A frame used to hold metal gongs which are used as musical instruments.
6 7 8	Khaung-laung.	Bell.	This name is given from the general resemblance of the part to a bell. It is divided into two parts by a band called the girdle. (7) The portion below the girdle is more especially "the bell." The portion above is called "Thabeit mhouk," that is "inverted Monk's dish."
8 to 9	Phaung reet.	Circular cornice.	These are generally nine in number.
9 to 10	Kya-lan.	Lotuses reversed, with a circle of beads dividing them.	
10 to 11	Nghet-pyau boo.	Plantain bud.	So named from being in the shape of that object.
12	Kyé-tsa-loung.	Copper lid.	Placed as a lid or cap at the top of the masonry.
13	IItee.	Umbrella.	The modern shape of this is derived apparently from the shape of the King's crown or cap of state. It is frequently called by the same name <i>Ma-gait</i> .
14	Tshap-thwa phoo.	A tree so named.	Name derived from the shape of the tree, or its bud.
15	Tsein bwen.	Diamond blossoms.	Ornaments so called.
16	Nghet-ma ná, or Nghet-myat ná.	The birds light not, or, the excellent birds light.	Name for the vane.
17	Tsein phoo.	Diamond bud.	The highest part of the spire.

*On the Great Rorqual of the Indian Ocean, with Notices of other Cetals, and of the Syrenia or marine Pachyderms.—By EDWARD BLYTH.*

The gigantic Whales (*Balaenidae*) of the intertropical regions of the ocean have been little studied. The existence of them is even ignored by Dr. J. E. Gray, in his elaborate synopsis of the known species of *Cetacea*, published in the Zoology of the Voyage of H. M. S. 'Erebus' and 'Terror' (1846), and again in the *Proc. Zool. Soc.*, 1847, pp. 88, 118; but there happens to be a very early notice of them at the northern extremity of the Arabian sea, in the narrative of the famous voyage of Nearchus, the Commander of Alexander's fleet which sailed from the Indus to the Persian Gulf *B. C.* 327. Not only did the ancient navigator encounter a troop of these huge animals; but it would appear that they were at that time not unfrequently stranded on the coast of Mekran, where the *Ictyophagi* of that woodless region used their bones for building purposes.\*

\* "The generality of the people live in cabins, small and stifling: the better sort only have houses constructed with the bones of Whales; for Whales are frequently thrown up on the coast, and when the flesh is rotted off they take the bones, making planks and doors of such as are flat, and beams or rafters of the ribs or jaw-bones: and many of these monsters are found fifty yards in length. Strabo confirms this report of Arrian; and adds, that the vertebrae or socket-bones of the back are formed into mortars, in which they pound their fish, and mix it up into a paste, with the addition of a little meal." *Vineent's Voyage of Nearchus*, p. 267.

Again, "Nearchus says, that on the morning he was off Kyiza or Guttar, they were surprised by observing the sea thrown up to a great height in the air, as if it were carried up by a whirlwind. The people were alarmed, and inquired of their pilot what might be the cause of the phenomenon; he informed them, that it proceeded from the blowing of the Whale, and that it was the practice of the creature as he sported in the sea. His report by no means quieted their alarm; they stopped rowing from astonishment, and the oars fell from their hands. Nearchus encouraged them, and recalled them to their duty, ordering the heads of the vessels to be pointed at the several creatures as they approached, and to attack them as they would the vessel of an enemy in battle: the fleet immediately formed as if going to engage, and advanced by a signal given; when shouting altogether, and dashing the water with their oars, with the trumpets sounding at the same time, they had the satisfaction to see the enemy give way; for

It is somewhat remarkable, however, that I have been unable to discover a single record, from the days of Nearchus to the present time, of the occurrence of great Whales in the Indian seas north of the equator; with the exceptions only of one huge fellow, described to have been 90 ft. in length and 42 ft. in diameter, which was stranded upon the Chittagong coast in 1842, another of 84 ft. in length, which was stranded upon an islet south of Ramri and east of Cheduba on the Arakan Coast in 1851 (as noticed by myself in the Society's Journal, *J. A. S.* XXI, 358, XXII, 414),—and to these two notices may be added the statement in the Rev. F. Mason's work on the Natural History of the Tenasserim Provinces, that—“The Whale is found south of Mergui, and Capt. Lloyd named a bay a few miles south of the parallel of 12° North, ‘Whale Bay,’—from the circumstance, he says, ‘of its being resorted to by numerous Whales, and its being the only part of the coast where I have seen them.’”\*

upon the approach of the vessels the monsters ahead sunk before them, and rose again astern, where they continued their blowing, without exciting any further alarm. All the credit of the victory fell to the share of Nearchus, and the acclamations of the people expressed their acknowledgment, both of his judgment and fortitude, employed in their unexpected delivery.” *Ibid.*, p. 269.

“The simplicity of this narrative,” continues Mr. Vincent, “bespeaks its truth; the circumstances being such as would naturally occur to men who had seen animals of this magnitude for the first time: and the better knowledge our navigators are possessed of, who hunt the Whale in his polar retreats, shews that he is sometimes as dangerous an enemy as he appeared to the followers of Nearchus.”

\* I have since obtained information of one of the largest size which was stranded near Karáchi some years ago, and also of two during the present year (1859) in Ceylon, one near Galle, the other near Trincomali. Referring to Dr. Kelaart's *Prodromus Faunæ Zeylonicæ* (1852), we find it there stated that “Whales are very rarely seen. A dead one is occasionally stranded. The skeleton of one cast ashore, some twenty years since at Mount Lavinia, is still in the museum at Colombo.” Sir J. Emerson Tennent, in his recent work on Ceylon, mentions their being frequently captured within sight of Colombo.

Since the above was written, I have received a letter from the Rev. H. Baker, Junr., of Alipi, S. Malabar, in which that attentive observer states—“Whales are very common on the coast. American ships, and occasionally a Swedish one, call at Cochin for stores during their cruises for them; but no English whalers ever come here that I have heard of. One said to be 100 ft. long was stranded on

They are, nevertheless, so far from being rare, indeed the sight of a shoal of these huge animals is so familiar a spectacle to mariners, that to this very circumstance—combined with the fact of their being of little commercial value—may be attributed the extraordinary absence of such memorial. Had the appearance of a shoal ('schule' or 'school' in nautical language) of enormous Whales in the Arabian Sea or Bay of Bengal been a phenomenon of unusual occurrence, it would unquestionably have been recorded from time to time.

From reliable information which I have obtained, I am enabled to state, with confidence, that they are still occasionally observed within the Persian Gulf,—rarely however in shoals, but generally one or two stragglers at a time. It may be concluded, therefore, that a shoal of them may yet be now and then seen off the coast of Mekran, at the head of the Arabian Sea a little further to the east, where Nearchus and his fleet encountered them; and that a carcass may still occasionally be stranded on the same rarely visited coast, and the bones even yet be applied to like purposes by the scanty fish-eating population of that inhospitable woodless region.

It appears, from much enquiry I have made on the subject, of competent observers, that only one species of Whale is met with in these seas, and all accounts agree that it is a 'Finner,' 'Fin-back,' 'Razor-back,' 'Pike-whale,' or Rorqual (BALENOPTERA), of enormous size. I cannot learn that a 'Hunch-back' (MEGAPTERA of Gray) has been observed north of the equator. An observant nautical friend writes word that "the Whale most generally seen in and about the Bay of Bengal, often in numerous herds, exhibits the dorsal fin; at least," he adds, "all that have come under my observation, and if my memory serves me correctly, the dorsal fin is about one-third or a

the coast. I saw some of the vertebrae and ribs about three years ago: last year, another, 90 ft. long, got among the reefs at Quilon, and was *murdered* by some hundreds of natives with guns, spears, axes, &c., and was cut up and *eaten* (salted and dried as well as fresh). The Roman Catholic fishermen of the coast pronounced it 'first chop beef.' The Maldives and Seychelles are said to be the head-quarters of the whalers who seek for these Whales. I am sorry I never noticed the jaw-bones sufficiently, for I saw them on the beach. We have the Dugong on the coast, and Porpoises come up the back-waters in March when they are salt, but the Susu I do not think is known here."

little more from the head and is well developed." To cite further communications of the kind would be mere repetition.

No other *Balaenidae* attain the dimensions of the largest **BALENOPTERÆ**, including the known examples stranded within the Bay of Bengal; and the peaked dorsal fin is of itself a distinction. Moreover, the finless or 'Right Whales' are restricted to cold latitudes, where only, it would seem, they can obtain a sufficiency of their peculiar food: the Rorquals subsisting mainly on *Cephalopoda*. According to Seorseby, the great Northern or Greenland Whale (*B. MYSTICETUS*) "has never been seen beyond the limits of the Arctic Ocean." Another (*B. JAPONICA*, Gray,—*B. australis* of Temminck apud Gray,) descends more southward in the comparatively cold oceanic region of the Northern Pacific. In the southern hemisphere there would also appear to be two species (recognised as such by seamen with whom I have conversed),—*B. AUSTRALIS*, Desmoulin (*le Grand Balein du Cap*, Cuvier,—*B. antarctica?* Lesson),—and *B. ANTARCTICA* Gray, (*vel antipodum*, Gray, figured in Dieffenbach's 'New Zealand'). In the Timor seas, 'Black Whales' in addition to 'Sperm' are stated to exist in considerable numbers; but those 'Black Whales' I have been assured are 'Hunch-backs', which are much more nearly akin to the 'Finners' or Rorquals: though I suspect them to be a small kind of Cachetot subsequently noticed (*EUPHYSETES GRAII*).\*

\* The locality known as *Wal-visch* (i. e. 'Whale-fish') Bay, latterly spelt 'Walwiev,' on the E. coast of S. Africa, is considerably within the southern tropic; but the name may well refer to Cachetots or 'Sperm Whales.'

In a short account of Timor, published in Moor's *Notes on the Indian Archipelago*, we read that the coast people of the island of Selvi (one of the Timor group) "are such expert fishermeu that they constantly take the species of Whale called *Black-fish*, which are often 20 ft. long, and which afford oil inferior only to the spermaceti, having the same substance in the head as the Spermaceti Whale. They do not boil the blubber, but expose it to the sun in an inclined situation with a ditch at the bottom into which the oil drains." A small species of the *PHYSETER* group must be here intended; but the *Black-fish* of the Bay of Bengal is *GLOBICEPHALUS INDICUS*, nobis. As for the Sperm-whale *fishery* in the eastern seas, the Sulu or Mindoro Sea, between Borneo and the Philippines, in from 50° to 100° E. L., is at present I believe the grand resort of the whalers.

'Sperm Whales' were formerly hunted off the shores of the Antilles. Thus, the excellent observer, Mr. Richard Hill, of Spanish Town, Jamaica, writes to his friend

The B. *MYSTICETUS* is generally believed to be the largest of the true *BALÆNÆ*; and it rarely attains to 70 ft. long, according to a very high authority, the late Rev. Capt. Scoresby: but Mr. Polack, whose work on New Zealand contains much original matter concerning the great Cetals of the Southern Ocean, states that B. *ANTARCTICA* "not unfrequently attains the length of 70 ft., and the breadth where the flipper is placed (which is the thickest part) is often 18 ft. The female is invariably the larger." B. *AUSTRALIS* is stated rarely to exceed 50 ft. in length. Again, the head in *BALÆNA* approaches to one-third of the entire length, while in the 'Finners' and 'Hunch-backs' it constitutes about a fourth. Lastly, the configuration of the chief bones of the 'flipper' or limb is very different in the *BALÆNÆ* to what is seen in the others, as shewn by Cuvier's figures in the *Ossemens Fossiles*. These various considerations enable me to pronounce, with confidence, on the genus of the two great individuals which have been stranded, of late years, on the eastern shores of the Bay of Bengal.

The following notice of the 90 ft. specimen (as alleged), that was cast upon the Chittagong coast in 1842 (in about Lat. 21° N.), is taken from a letter that appeared in the 'Friend of India' newspaper for Sept. 15th of that year. It appears that "early on the morning of the 15th August, the attention of the people of Cox's Bazar, and those of Muskal island, were attracted by something in appearance like a capsized hull of a large vessel, floating on the surface of the sea, coming towards the mouth of the Muskal river, and when it approached near the land they perceived that it was a living creature, by its continually spouting up water into the air, and by the middle of the day it cast itself on the shore of the west

Mr. P. H. Gosse, that—"Moreau de St. Meri, in his History and Description of the old French Colony of St. Domingo, relates that in his time (1785), in the months of March, April, and May, as many as five and twenty vessels from the North American States could be seen on the coast off Sale Trou near Jacmel, fishing for Cachet Whales, and, he adds, for *Souffleurs* (*BALÆNOPTERA*); and that this fishery was with equal spirit pursued within the Gulf to the west of the colony; —that is, within the bight, in which I saw the Cachet breach. The whale-fishers resorted to Turk's Island to boil their oil." *A Naturalist's Sojourn in Jamaica*, p. 353.

side of Muskal island. By the assistance of the flood and the surf of the sea, it was brought completely on shore, where, as soon as it was landed, it appeared to be in great distress; for it roared very loudly, similar to the roar of an old Elephant. As soon as all the Mugh inhabitants, both of Cox's Bazar and Muskal island, heard of the circumstance, they all sallied to the spot, and found that it was a large Whale. They then measured it, and found it to be 60 cubits (equal to 90 ft.) long and 28 cubits (equal to 42 ft.) in circumference. They then cut up the animal and each one helped himself to a large portion of the blubber, from which a quantity of oil was extracted. *Two flakes of its gill* [! flakes of *baleen*] were brought to me," remarks the writer, "which are indeed a great curiosity." The foregoing details were obtained from a Mugh Christian, who is not likely to have remarked the presence of a back-fin.

The other recorded example, stated to have been 84 ft. in length, was thrown up dead upon Juggu or Amherst islet, about 2° further south, during the rainy season of 1851. A few of the bones were collected in the following year by the present Major T. P. Sparkes, then Asst. Commissioner of Ramri, and were presented by him for the Society's museum. They consist of the two *rami* of the lower jaw, a right rib (probably the third of the series), the left *radius*, and five *vertebræ*. The proportional length of the *radius* indicates the animal to have been a **BALENOPTERA** or Rorqual; while the remarkable slenderness of the lower jaw suffices to prove it a distinct species from any hitherto described Rorqual.

The only Whale, indeed, that I can find to bear comparison with it is one described in the *Philosophical Transactions* (Vol. I, 11), as cited by Dr. Gray, who refers it to his **MEGAPTERA AMERICANA**, founded upon the tracing of a drawing of a species stated to be common off the Bermudas (an almost subtropical locality). That Whale is thus described:—"Length of adult 88 ft.; the pectoral 26 ft. (rather less than one-third of the entire length); and the tail 23 ft. broad," &c. From the medium length of the *radius* of the Indian animal, the species must be very different,—in fact a **BALENOPTERA** as distinguished from a typical **MEGAPTERA** or 'Hunch-back.'

But the lower jaw is remarkably slender for a BALENOPTERA, even more so than in BALENA MYSTICETUS (as viewed laterally, *vide Oss. Foss.* pl. XXVI, f. 9); while the coronoid process is well developed, as in Gray's figure of the lower jaw of BALENOPTERA ROSSTRATA (*Zool. Voy. 'Erebus' and 'Terror,' Cetacea*, pl. 2); the base of the jaw, however, posterior to the process is not deeper as in that figure, but the reverse, and the jaw is proportionally much longer anterior to the process. The entire length of each *ramus* is within less than 2 in. of 21 ft., shewing the head to have been about a fourth of the total length. Vertical diameter, 3 ft. in advance of summit of coronoid, 18 in. (measured by callipers); at 3 ft. from tip, 13½ in.; and, where most contracted posterior to the coronoid, 15 in. only: extreme depth, at coronoid process (inclusively), 26¾ in. From middle of coronoid to summit of condyle posteriorly, in a direct line, 37½ in. The shaft of the *ramus* is more approximatively of the same thickness throughout than in BALENA MYSTICETUS, tapering quite evenly.

The *radius* is 38½ in. long, nearly similar in shape to—but more curved than—that of MEGAPTERA POESKOP (*Rorqual du Cap*, Cuvier, *Oss. Foss.* pl. 227, f. 22, c.). The shape of this bone in BALENA (as figured by Cuvier) is remarkably different.

The rib is proportionally small, measuring only 8 ft. 2 in. round its curvature to superior articulation. It is probably the third of the series, on the right side.

Of the five *vertebræ*, two are dorsal, about the 6th and 7th; but they have been much hacked and are mutilated of their processes. Body of the *vertebra* (hind surface) 11½ in. deep by 15 in. broad. A lumbar *vertebra*, probably the first, has the body (measured posteriorly) 13½ by 16½ in. broad; antero-posterior diameter, 14 in.; spinal apophysis 27 in. (or a trifle more, allowing for the extreme tip which is broken off)—measured from the front, and sloping backward at an angle of nearly 45°.\* Another lumbar *vertebra*, probably the 5th or 6th, with spinal apophysis 8 in. in antero-posterior

\* In the figure of the skeleton of the great Northern Rorqual in the Volume on *Cetacea* in Jardine's *Naturalist's Library*, pl. V, the *apophyses* of the dorsal *vertebræ* are represented to slope forwards!

diameter, and lateral processes 12 in. long and  $8\frac{1}{2}$  in. broad. Lastly, a caudal (?) vertebra,\* about the 4th; the body (posteriorly) 15 by  $17\frac{1}{2}$  in. broad.

In *As. Res.* XV, *App.*, p. xxxiv, "a large jaw-bone of a Whale" is recorded as having been presented by Mr. J. Kyd, (1822-5). It was only the basal portion of one, and is now much injured by long exposure to the weather out-of-doors; but it appears to have belonged to a rather smaller individual of the same species, which I think we may safely venture on designating **BALENOPTERA INDICA**.

In *As. Res.* XVII, 624, and *Gl. Sc.* II, 71, "the vertebrae and cranium of a Whale" are recorded as having been presented by G. Swinton, Esq. (1830). These also are now much damaged and mostly valueless, from long exposure to all weathers,—the result of want of accommodation for such bulky specimens in our excessively overcrowded museum building. The length of this Whale was about 30 ft., of which the head was about a fourth. Probably the young of **BALENOPTERA INDICA**, rather than another and smaller species. A fine skull of the same, with *rami* of the lower jaw measuring 10 ft., was obtained by the late Professor H. Walker from a friend in Arakan, and is now in the museum of the Calcutta Medical College. It is most probably from the Bay of Bengal.†

There are other remains of **BALENIDÆ** in our museum, the origin of which I have been unable to trace,—at least when and by whom presented: but they were in the collection prior to my taking charge of it in 1841. Portions of one skeleton appear to be referable to **BALENA AUSTRALIS**, Desmoulin (*le Grand Balein du Cap*, Cuvier), or ordinary southern 'Right Whale.' These consist of three *vertebræ*, a pair of *humeri*, and a pair of *scapulæ*. One *humerus* and one *scapula* have now been injured by long exposure out of doors; but the others are in tolerably good preservation, and well agree with Cuvier's figures in the *Ossemens Fossiles*; the *acromion*

\* I mean one of the series with inferior 'V-bones' attached; not one of the small caudal that support the tail-flukes.

† In the Society's 30 ft. specimen, the bases of the lower jaw are mutilated, only the shafts remaining; but in the Medical College skull the coronoid, &c., of the lower jaw accord with those of our 21 ft. jaw.

being present only in the injured *scapula*. The *scapula* measures 41 in. long by  $47\frac{1}{2}$  in. in the extreme breadth. The *humerus* 22 in. long by 15 maximum and  $9\frac{1}{2}$  in. minimum breadth. Of the *vertebrae*, one is worked into a fancy chair, and is an uninjured first dorsal; body  $8\frac{1}{2}$  by  $10\frac{3}{4}$  in. broad, measured posteriorly; the lateral processes 12 in. long. Another is probably the third dorsal; and the remaining one is probably the fifth dorsal,  $13\frac{1}{2}$  by 14 in. posteriorly, and 12 in. in antero-posterior diameter: the spinal apophyses of both are broken away above their *alæ*. It will be understood that I merely adjudge these to be portions of the same skeleton.

Of two pairs of the internal ear of "The Whale," one pair is likely to belong to the last noticed individual, the other pair perhaps to the 30 ft. *BALENOPTERA*, which, however, is less probable, judging from their great size. It is not likely that they appertain to the same species, as one pair is nearly equal in size, while in the other the left is much larger than the right. From this great inequality, I am inclined to suspect that the latter pair belong to a Cachetot or 'Sperm Whale.' A large left internal ear, without a right to match it, is probably that noticed in *J. A. S.* V, 374, as having been presented by the late James Prinsep; and there is even another left *cochlea* only. On present data, I cannot venture on attempting to identify the precise species or even genera to which these specimens belong.

The Cachelots or 'Sperm Whales' (*Catodontidæ* of Dr. Gray), I humbly consider to constitute a subfamily rather of *Delphinidæ*; especially since the discovery of that very remarkable small species, the *EUPHYSETES GRAII* of Mr. W. S. Wall, Curator of the Australian museum, Sydney. That gentleman well argues the matter, in his 'History and Description of a new Sperm Whale,' &c., Sydney, 1851; of which he favored me with a copy. Unless the ear-bones before referred to belong to this group, we have only five teeth of a 'Sperm Whale,'—by whom presented I have been unable to discover.\*

\* Mr. Polack has a curious statement regarding the 'Sperm Whale,' to which I invite attention. He says—"The Cachetot is covered with an outer cuticle, as transparent as 'gold-beater's skin,' beneath which it is covered with hair per-

Of ordinary *Delphinidæ*, one of the most common species in the Bay of Bengal is that generally known as the 'Black-fish' to seamen, and named by me *GLOBICEPHALUS INDICUS* in *J. A. S.* XXI, 358. This was first noticed in XIX, 426; a large herd or 'school' (*i. e.* shoal) of these animals having been carried into the salt-water lake E. of Calcutta during the month of July, 1852. It is remarkable that two specimens which I have since obtained were procured during the same season of the year, *viz.* one taken in the Hugli near Serampore,  $6\frac{1}{2}$  ft. long (in 1858), and a newly born young during the present year (1859), which was brought to the Calcutta fish-bazar. The species is well distinguished from *GL. DEDUCTOR* of the Atlantic, of which we have a fine skull of an old animal for comparison. The inter-maxillaries of the Indian species are shorter and one-fourth broader, and the teeth are considerably stouter. Colour of the animal uniform leaden-black, slightly paler underneath. Length of an adult male 14 ft. 2 in.; the flippers 2 ft., and 6 in. in greatest breadth. Length of dorsal fin  $2\frac{1}{4}$  ft., and height 11 in. Breadth of tail-flukes 3 ft.; and from vent to cleft of tail 4 ft. 10 in. Adult female rather smaller. The skeleton of a female set up in our museum has a series of 49 *vertebræ*, additional to the united cervical. There are 11 dorsal or costal, 12 lumbar without the articulated 'V-bones,' 16 with the latter, and 10 small caudal within the tail-flukes. We possess skeletons of the adult male and female, the latter set up; the  $6\frac{1}{2}$  ft. example mounted as a stuffed specimen; and the new-born young as a skeleton. There is also a skull of this species in the museum of the Calcutta Medical College.\*

feetly sleek and black, covered with an uliginous matter, the texture and length resembling the clothing of the Seal tribe."

\* I had much trouble in securing our two skeletons of this fine Cetacean. The animals were floundering about in all directions in the shallow water, and groaning painfully, *vide J. A. S.* XIX, 426. From what I afterwards learned, there must originally have been several dozens of them, which the natives towed off into the river as they died, having no notion of extracting oil from their carcasses. The weather was terrifically hot; but I succeeded the first day in securing two pairs of the largest, male and female, and had them safely tied up towards evening for operations on the day following. They were all cut adrift during

There is a *GLOBICEPHALUS* also in the China seas, of which a description, with details of its anatomy, is published in the *Chinese Repository* for January, 1833, p. 411. The specimen (a male) was taken near Leu-chen ; and, though designated *GL. RISSII* by its describer, is probably of a distinct species. Colour black above, lighter on the belly. Length  $9\frac{3}{4}$  ft. " Head 18 in. long, and average circumference 3 ft. There were only five blunt and eroded teeth in the lower jaw. The dorsal fin was triangular and almost immovable, 15 in. long ; pectorals 14 in. ; and all remarkable for their firmness and strength. \* \* \* This species does not spout a jet, though their breathing is distinctly heard at a short distance : they swim near the surface ; and we had several opportunities of observing their habits during the voyage. The sailors term them 'Cow-fish.' "

Another small Cetacean of which we possess a stuffed specimen is that described as *DELPHINUS PERNIGER*, Elliot, *J. A. S.* XVII, 250, from the Bay of Bengal : the species distinct from any of those described by Dr. Gray, and having the teeth proportionally large.

Of other Cetaceous remains, we have the Narwhal tusk presented by Mr. Lumsden (*As. Res.* XIV, *App.*) ; the skulls recorded in *J. A. S.* VIII, 969, from Greenland ; and the two skeletons from Norway, *J. A. S.* XV, *Proc.* IX. Also two skulls of *STENO ROSTRATUS*, (Cuv.), one of an animal taken near the Nicobar islands, the other from the Red Sea : and a skull which seems to be that of *ST. ATTENUATUS*, Gray (*Zool. Voy. 'Erebus' and 'Terror,' Cetacea*, pl. 28), being probably that mentioned of "a Dolphin found near the Isle of France," *As. Res.* XII, *App.* XXIV. Lower jaw 14 in. Teeth  $\frac{41}{1}$ . Another lower jaw, "from the High Seas," with series of 38 teeth, presented by Mr. C. Hervey, *J. A. S.* X, 937 ; and two skulls, toothless, and wanting the lower jaw, with series of 39 tooth-sockets. Length 15 and  $15\frac{1}{2}$  in. Origin unknown, but presented by myself. All of these would appear to be the same ; but the left *ramus* of a lower jaw, with series of 43 teeth, is vertically much

the night ; and the work had to be begun again : and I considered myself fortunate in succeeding so well as I did, in obtaining two perfect skeletons for the Society's museum.

deeper at the *sympysis*, and therefore undoubtedly appertains to a distinct species.

Also a skull according with **DELPHINUS EURYNOME**, Gray, and another with **D. OBSCURUS**, Gray; which, together with the Red Sea example of **STENO ROSTRATUS**, were made over to the Society's museum from that of the Calcutta Medical College in 1843. Lastly, the skull of a Dolphin affined to **D. DELPHIS**, L., and "procured during the voyage from England to India," *J. A. S.* XVI, 386. Presented by the late R. W. G. Frith, Esq., and probably an undescribed species. With a general resemblance to that of **D. DELPHIS**, the inter-maxillaries—united as far as the middle of the *rostrum*—are vaulted so that the section of their united middle portion forms a complete semi-circle, rising abruptly from the maxillaries, and being there only as broad as the exposed portion of each maxillary; probably a distinctive specific character. Teeth  $\frac{52-55}{50-59}$ . If confirmed as a new species, **D. FRITHII, nobis.**\*

Of the Gangetic 'Susu' (**PLATANISTA GANGETICA**), we have a stuffed male, presented by M. Alfred Duvauzel, *As. Res.* XV, *App.* xxxii. A stuffed female, and also a stuffed example of a young female, procured by myself. With skulls of adult male and female, the former toothless, and presented by Dr. Wallich, *As. Res.* XII, *App.* xxvi. The entire skeleton I have long been trying to obtain. There is a fine series of skeletons of this species in the museum of the Calcutta Medical College.†

\* Since the above was written, Capt. Jethro Fairweather, commanding the ship 'Forfarshire,' has favored us with the skull of a small but not young **STENO**, which seems to be **ST. ATTENUATUS**, Gray. It was procured not far from the Sandheads, out of an innumerable herd of them, "as far as the eye could reach in all directions," and was of a palish lead-colour,—not therefore, however, the **D. MALAYANUS v. plumbeus**, which is a much larger species common in the Bay. Teeth  $\frac{39-40}{41-42}$

Major R. C. Tytler, also, has presented a skull taken W. of the Cape G. Hope, which agrees or very nearly so with the two heads *minus* the teeth and the lower jaw, mentioned in the text.

† Though abounding in the river Hugli, the 'Susu' is extremely difficult to procure, at least in the vicinity of Calcutta; and too often when a fine example is taken the captors saw off the *rostrum*, rendering it useless for a museum spec-

The skull of a 'Susu' from the Indus, presented by the late Sir Alexander Burnes, is of a conspicuously distinct species, which I designate

PL. INDI, nobis, n. s. Maxillary crests wanting in the specimen. Larger and much more robust than PL. GANGETICA, with the same number of teeth which are more than twice as stout as in the other, being much ground down by attrition in the specimen. Length of skull  $20\frac{1}{4}$  in.; greatest width at *zygomata*  $9\frac{1}{4}$  in.; depth of the two jaws, with teeth *in situibus*, measured in the middle of their length,  $3\frac{1}{4}$  in.,—in PL. GANGETICA barely  $1\frac{3}{4}$  in. Length of *sympysis* of lower jaw 11 in. Depth of zygomatic arch  $2\frac{3}{8}$  in.

A coloured figure of probably the identical individual that furnished the skull above described occurs among the Burnes' drawings. The *rostrum* is represented as short in proportion to the length of the animal, and the neck to be more contracted than in the Gangetic species, which may be an error of the draughtsman. Colour also much paler, the lower-parts dull albeseent, abruptly defined in a line from the gape to the tail-flukes. The specimen is evidently female; whence the male should have a longer *rostrum*. The dimensions assigned are "7 ft. long by 1 ft. 3 in. deep." Rudimentary dorsal fin as in the Gangetic species.

imen. In what I believe to be the adult male, the *sympysis* of the lower-jaw measures 17 in.; in the adult female only 12 in.; the *rostrum* being thus 5 in. longer in the former.

The 'Susu' ascends very high up the rivers, if not quite to the foot of the mountains. Hardwicke's drawing was "made from a living specimen 1000 miles above Calcutta." Major Tytler assures me that he has seen them about 40 miles up the Jumna, and also at Raj-ghât Mundi in the Dehra Dhoon. Likewise in the Indus and Sutlej near Ludiâna; but these were doubtless of the species proper to the Indus and its tributaries. The Gangetic 'Susu' is common throughout the valley of Asám, in the Brâhmaputra and its tributaries. Whether inhabiting the Irawâdi and other Burmese waters I am unaware; but have been assured that no such animal exists there. From the minuteness of its eyes, this creature is obviously adapted for turbid rather than for clear water; and it has never been observed out to sea. It is migratory, as it occurs towards the Gangetic outlets only in the cold season, as remarked by Dr. Cantor; but at what particular season it is observed in the Upper Provinces I have been unable to ascertain.

Further information respecting the 'Susu' of the Indus and its tributaries is very desirable.\*

Of the *Syrenia*, or *Gravigrada* of de Blainville, the *Cetacea Herbivora* of the Cuviers (which Professors de Blainville and Owen have shown most satisfactorily to be much more nearly akin to the quadrupedal Pachyderms†), we have only the genus *HALICORE* or Duyong. The skull and the lumbar and caudal portion of the vertebral column of an adult, I made out long ago to pertain to *H. AUSTRALIS*, Owen, the Australian Duyong as distinguished from that of the Indian seas, or *H. INDICUS*, F. Cuvier: but how we came by an Australian specimen was an enigma only very recently solved. In Corbyn's *India Review*, III, 46 (1838), there is a memoir of the late Dr. Robert Tytler, of the Bengal Medical establishment; and in this memoir we read that—"During his various expeditions, Dr. Tytler made some valuable collections of natural curiosities, of which he largely and liberally contributed to the Asiatic Society of Calcutta. In 1827, he read a paper on the Duyong, or Dayoung. The bones of four different individuals were picked up by Dr. Tytler at Raffles Bay, on the north coast of New Holland. In one instance they were sufficiently numerous to form nearly an entire skeleton of the animal. This creature is not uncommon in the eastern archipelago, but its existence on the coast of New Holland was made known for the first time by Dr. Tytler."—Hence, obviously, our bones of *HALICORE AUSTRALIS*.‡ I am not aware that it is yet generally known to zoologists that the *H. AUSTRALIS* differs

\* The existence of the *Susu* of the Indus, as a particular species, is referred to in Prof. Reinhardt's admirable paper on the Gangetic species, a translation of which (by the late Dr. Wallich) appears in the *Ann. Mag. N. H.* for 1852, pp. 162, 279, and *vide* p. 291. An excellent figure of the animal accompanies that paper.

† *Vide Proc. Zool. Soc.* 1838, p. 45, &c.

‡ The existence of a Duyong on the Australian coast was recognised so long ago as by Peron, in his account of the *Voyage of Discovery to Australia*, made by the *corvettes* 'Geographic,' 'Naturaliste,' and *goelette* 'Casuarina' (1800-4),—"edited by M. Francis Peron, naturalist to the expedition," and published in 1807. Dampier mistook them for Hippopotami; but he only saw a head, "half decomposed by digestion;" and the tusks doubtless helped to mislead him, for little in his time was known of Hippopotami beyond their tusks, our accurate acquaintance with this animal being still quite recent.

conspicuously in external colouring from *H. INDICUS*; but such appears to be the fact from the following notice:—

Peron only saw a few teeth; but he mentions one of these animals which “lay extended on the beach, of 20 to 22 decimètres [6½ to 7 ft. English] in length, already half-decomposed by putrefaction, and which appeared to our sailors,” he adds, “so different from the *Phocæ*, that they thought they ought to bring its remains to me. Unable to bring the entire head, on account of the extreme stench which it exhaled, they tore from it seven teeth, which they offered me. It was easy for me to discover that these teeth belonged to a herbivorous animal. They proved, in fact, to be the teeth of a Dugon, a mammiferous sea-animal, but little known, and which appears to be confined to the Indian Ocean.” He then cites Leguat’s account; but this worthy writer observed them at the Mascarene Islands (Mauritius, Rodriguez, &c.), where they are now, so far as I can learn, quite extinct, and the species may have been different,—perhaps that from the Red Sea, styled *H. TABERNACULI* by Dr. Rüppell: it may, however, still be found off Madagascar and the neighbouring coast of Africa.

Leguat, with his party of French protestant refugees, settled on the then uninhabited island of Rodriguez in 1691, and remained there for two years. His account is celebrated for the description of the now extinct ‘Solitaire’; and his accuracy in other matters has been established. He mentions Duyongs as inhabiting the shores of the Mascarene Islands “in great numbers. They attained to 20 ft. in length, and fed in flocks like Sheep in three or four fathoms’ water, making no attempt at escape when approached. Sometimes they were shot at the end of the musket, sometimes laid hold of and forced on shore. Three or four hundred were met with together, and they were so far from shy that they suffered themselves to be handled, and the fattest were thus selected. The larger ones were avoided, not only on account of the trouble they gave in the capture, but because their flesh was not so good as that of the smaller and younger ones.” (*Penny Cyclopædia*. Art. ‘Whales.’)

The *H. TABERNACULI* of the Red Sea, Dr. Rüppell “saw swimming among the coral banks on the Abyssinian coast near the Dahlæ Islands. The fishermen harpooned a female, which he dissected, 10 ft. long. The Arabs stated that they live in pairs or small families, that they have *feeble voices*, feed on *algæ*, and that on February and March bloody battles take place between the males, which attain to 18 ft.” &c. (*Ibid.*)

Sir Stamford Raffles remarks that “the Duyongs are seldom caught at Singapore above 8 or 9 ft. in length; but how much larger they grow is not ascertained, as, when they exceed that size, their superior strength enables them to make their escape.”

Barchemitz remarks, of those of Australia, that—“Each of these enormous fish is more than 21 ft. long; the male is a little larger than the female; their heads resembled that of an Ox. They live upon a green grass which grows upon the banks.”

"In Morton Bay and on the neighbouring coast the aborigines eagerly pursue the Duyong, a species of small Whale, generally known to the colonists as the 'Sea-pig.' This animal has a thick smooth skin, with a few hairs scattered over its surface. Its colour is bluish on the back, *with a white breast and belly.*\* In size the full-grown male has never, we believe, been found more than eighteen or twenty feet long. The food of the Duyong consists chiefly of marine vegetables, which it finds at the bottom of inlets, in comparatively shallow water, where it is easily captured. Its flesh re-

Some of the sailors of the expedition that Peron accompanied were once "alarmed by a terrific howling which resembled the roaring of a bull, but much stronger, and seemed to come from the neighbouring reeds." This was near the Swan River; and it may be remarked that Mr. Fraser, in his description of the Swan River, when it was surveyed by Capt. Stirling in 1826, notices that—"while attending to a boat on the river, I distinctly heard the bellowing of some huge animal similar to that of an Ox, from an extensive marsh further up the river." Peron justly remarks that "this terrific roar could only belong to one of those great animals which the Indian Ocean nourishes within its seas; but of all those with which we are acquainted, the Dugon alone presents analogous dimensions to the terrific noise which it makes."

Now the Arabs described to Dr. Rüppell that the Duyong of the Red Sea had a feeble voice!

The Australian Dnyong is met with on the north coast of that island-continent, within the great barrier reef, at Swan River on the western side, and at Morton Bay on the eastern. It certainly appears to be a distinct species from that of the Malayan seas; but additional species to these two are less satisfactorily established, and the total disappearance of these animals from the vicinity of the Mascarene Islands is worthy of attention, and may be borne in mind with reference to the extraordinary fact of the seeming extinction of the *Rytinus Stelleri* in the N. Pacific. We want information, however, respecting Duyongs at the various coral groups of the Indian Ocean, within ten or twelve degrees of the equator. The same species may well inhabit the whole of them. It is remarkable that the Malays consider that two species of these animals exist. *Vide Proc. Zool. Soc.* 1838, note to p. 43.

\* M. F. Cuvier figures the Malayan Duyong of an uniform pale slaty or plumbeous colour, with some darker blotches on the sides. In the *Atlas to the Voyage of the Astrolabe*, the Duyong is figured of a pale fulvous hue with white under-parts, which laterally are blotched with the colour of the back. Hardwicke figures it of an uniform slaty-black, albescens on the head (unless this be meant for *shine* or reflected light). There is a wood-cut shewing the mode in which the female carries her young in Sir J. E. Tennent's work on Ceylon.

sembls good beef, and is much esteemed. The oil obtained from its fat is peculiarly clear and limpid, and is free from any disagreeable smell, such as most animal oils are accompanied with. It has not yet been produced in sufficient quantities to acquire a recognized market value. The blacks devour the carcase of the Duyong roasted, after expressing the oil for sale to the colonists.”\*

Of the Indian Duyong we possess a small stuffed specimen, presented by the Batavian Society in 1845; and the lower jaw, *scapulae*, and four ribs of a larger but still young individual, recently found in an Andamán hut. The Andamán islands are the most northern locality as yet ascertained for the species in the Bay of Bengal; and it must be rare there, or the bones would more frequently be found to decorate those rude huts (huts they cannot justly be termed, together with the skulls of the small *SUS ANDAMANENSIS* and of Turtles. On the west coast of Ceylon, Mr. Layard notices that Duyongs are common in the Gulf of Calpentyn; the flesh of this animal being there also held in esteem. Sir J. E. Tennent, again, remarks their occurrence in all the salt-water inlets from the Gulf of Calpeutyn to Adam’s Bridge. They are found likewise along the shore and in the salt-water inlets of the Concan, where, as not long ago ascertained by the Rev. J. Baker, Junr., of Mundakynn, Alipi, on that coast, they are known to Europeans as “the Seal.” That gentleman took some pains to discover what the animal could be, and found that it was the Duyong, which came to feed on the vegetable matter found about the rocks, as well as to

\* ‘The Three Colonies of Australia’ (p. 337). By Samuel Sidney. London 1852. In a recent anonymous work, entitled ‘Rambles at the Antipodes,’ &c. (1859), the Duyong is mentioned as the *Yangan* of the aborigines. This author, like every other (from the time of Sir Stamford Raffles and before), describes the meat of the Duyong to be excellent. “When fresh having the taste of tender beef, and when salted nearly resembling bacon.” Hence, perhaps, the appellation ‘Sea Pig.’ The Duyong, it is added, “yields an oil, which is found, in cases of scrofula and other diseases, to be more efficacious than cod-liver oil.” The latter would seem to be rising in demand; worse luck for the animal! A friend informs us that it is most difficult to obtain even a portion of Duyong meat at Malacca; as, no sooner is a specimen captured, than it is at once cut up and cooked by the Malays. Hence the difficulty of obtaining museum specimens.

bask and sleep in the morning sun (!). Forbes, in his 'Oriental Memoirs,' gives an account of these so-called 'Seals' as "abounding in the salt-waters of Travancore;" but his description of them is either inaccurate, or it must refer to some other animal (which is exceedingly unlikely). He says—"The Travancore Seal has a round head, *short ears*, thick neck, tapering body, and flat tail, like a fish; it is web-footed, and *the skin covercd with a soft oily hair*. Seals," he adds, "vary in size and appearance in different countries: at Anjingo they seldom exceed 4 ft. [!] in length: they are gregarious and sociable; form parties on the banks of the rivers, but always plunge in at the approach of a stranger." (2nd edition, I, 227.)

In our Andamán specimen of a lower jaw, the first molar has a minute forked crown and proportionally very large root. Then follow three deciduary pre-molars, ground to a perfectly flat surface; and behind these a tuberculated permanent molar, which had nearly pierced the gum when the animal came by its death.

A complete skeleton of an adult Duyong would be extremely acceptable for the Society's museum; no matter how roughly prepared, provided no bones are wanting. Skulls, also, of adults of both sexes are desirable.

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#### LITERARY INTELLIGENCE.

The following is extracted from a letter to Dr. W. N. Lees from Mr. Wright of Dublin, dated 16th October, 1859.

"I do not think that I have ever written to you to thank you for your last present, the *Introduction* to the *نفحات الانس* In my last parcel from Williams and Norgate I have just received the *Persian text* of that work, and the 3rd and 4th vols. of the *Kashsháf*; which I was glad to see is advancing so rapidly. At home but little of consequence has been done in the Arabic line, excepting *Wüstenfeld's Histories of Mecca* (*cl-Azraqi, Kotb-al-dín, &c.*) and *Life of the Prophet* by *Ibn Hishám*, and an edition of *Mutanabbi* by *Dicterici* of Berlin. *Sprenger* is busy with his life of Mohammed, as I see from his last letter to me. A volume has lately appeared at Gotha, containing a catalogue of the *Persian MSS.* there, by a young scholar named *Pertsch*. *Fuller's Persian Lexicon* seems to

have come to a stand still. In Sanskrit I can announce the issue of *Max Müller's* History of early Indian Literature (on the *Veda* and the works connected therewith). *Aufrecht* has published within the last year an edition of the *Unádi-sútras* with commentary by *Ujjvaladatta*, and is now editing a small lexicon by *Haláyudha*. Both works are accompanied by glossaries and notes. The first vol. of his catalogue of the *Sanskrit* MSS. in the Bodleian Library ought to appear by the end of this year, I think, if the curators assent to its separate publication. I hope you have received copies of the 1st vol. of my Arabic Grammar, which I directed Williams and Norgate to send to you. I am now busying myself with the 2nd vol., which should appear in the course of next year. I am also just making up a list of corrections on my vol. of *Al-Makkari*. The 5th and last part of the work (Indices and corrections) will go to press shortly. *Dozy* is, I may mention, just bringing out a new edition of his "*Recherches sur l'histoire &c. de l'Espagne*," more popular in style than the 1st vol. was, and contained in two vols. 8vo. The work will probably be translated into English. This is, I think, all the literary news with which I can at present furnish you. Wars and rumours of wars render literature as flat as merchandize."

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Dr. Sprenger writes from Berne in a letter dated 31st October.

" You have of course seen Wright's translation of Caspary's Arabic Grammar. It is admirably done and much required. It is a great pity that oriental scholars in India never learn the rudiments of the oriental languages. The consequence is that, wherever criticism and European mind are required, they are completely out, and their Moonshees are of no great use in such cases. Lane is advancing fast with his gigantic Arabic Lexicon. Else I believe there is not much doing in England. In France Mons. Renan begins a new epoch,—he is a man of genius and extensive learning, and instead of quarrelling about words and letters as the school of De Sacy used to do, he enters into the spirit of the ancient history of the East. There are some excellent contributions of his in the *Revue Germanique*, a periodical which you ought to have. Slane is at Paris and engaged with translating Ibn Chaldún's Philosophy of history, the text of which has been edited by Quatremère. It

is the most remarkable book in the Arabic language. The doings of Germany you learn from the *Zeitschrift*. Dr. Juynboll is engaged with bringing out Ibn Hawqal's *Geography*. He works conscientiously, but it would be a mercy if he would spare us his erudit notes. In that respect the edition of Ibn Batúta is a pattern—exact and critical without childish show of erudition. Amari, a noble fellow, who was in 1848 a member of the provisional Government of Sicily, is going as Professor of Arabic to Florence, and it is to be hoped that, under his influence, oriental literature will make progress in Italy. His book on the history of the Arabs in Sicily is a work of great merit. Professor Dorn of St. Petersburg is engaged with a history of the Persian provinces on the Caspian Sea and was last summer in England to collect materials."

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In Sanskrit Lexicography Messrs. Böhtlingk and Roth have completed the letter अ, and Dr. Goldstucker has issued a 3rd part of his voluminous undertaking which reaches to the word अभिचैय. We regret to find that the unwieldy plan with which he commenced, becomes only more and more gigantic with every fresh fasciculns. The last part (containing 80 pages) only corresponds to *ten* pages of Wilson's second edition.

Prof. Behrnaner of Vienna is engaged in bringing out an edition of Abu Schamali's كتاب ابو ضيدين which he is publishing also in the Beirut Journal, entitled حديقة الاخبار.

The breaking up of Capt. Tripe's establishment by the Madras Government is a step which will be regretted by all who take an interest in Indian antiquities. It is gratifying, however, to hear that he has completed photographs of the curious Buddhist sculptures which were brought to Madras several years ago by Mr. Walter Elliot from Dipaldinni on the Kistna, as well as of the temples and remains at Madura. Capt. T. succeeded also in taking a photograph of the ancient Tamil inscription round the base of the great temple at Tanjore. Is it too much to hope that Col. A. Cunningham, to whom, we are aware, Mr. W. Elliot has forwarded a copy of the drawings, will give us his interpretation of the Buddhist sculptures?

Synd Ahmed's Oordoo account of Delhi, published some four years ago, is being translated by M. G. de Tassy and will shortly appear either in the *Journal Asiatique* or the *Revue de l'Orient*.

## NOTICES OF NEW WORKS RELATING TO SANSKRIT LITERATURE.

*Ujjwaladatta's Commentary on the Uṇádi Sútras, edited from a MS. in the Library of the E. I. H.—By THEODORE AUFRECHT. London, 1859.*

The Uṇádi Sútras are well known in connection with one of the most interesting questions discussed by Indian grammarians, viz. whether it be possible or not to derive all nouns from verbal roots. On the one hand Gárgya and Patanjali deny it, while Yáska and Sákaṭayana maintain the affirmative.\* The Uṇádi Sútras are a very old attempt to carry out the latter principle, by inventing a system of rules to explain those words which, if derived from a verbal root at all, have diverged from any direct connection with its meaning,—and in some instances from all apparent connection direct or indirect, as in ‘náku,’ an ant-hill, from ‘nam’ to bend, or ‘mayúra,’ a peacock, from ‘mi’ to hurt. Fanciful as many of these derivations may seem, they at any rate are conducted on a system and principle, and are thus far superior to the random guesses of the Greek grammarians, as in the *Etymologicum Magnum*.

The Uṇádi Sútras are older than Páṇini (i. e. 300 B. C.) as they are thrice quoted in his Sútras (iii. 3. 1, 2. iii. 4. 75.) and it is not improbable that they may have been composed by Sákaṭayana. They derive their name from the affix, which is mentioned in the initial sútra, “*kri-vá-pá-ji-mi-swádi-sádhy-as'úbhya uṇ.*”

Dr. Aufrecht has given us a very valuable edition of these Sútras with an hitherto unpublished commentary. The only previous edition had been that in the Siddhánta Kaumudí with a commentary by Bhaṭṭoji Díkshita (reprinted by Dr. Böhlingk, 1844), but both the edition and its reprint were marred by innumerable errors, and many of the worst description. The present commentator is earlier than Bhaṭṭoji, his age being fixed between two limits. ‘He very frequently quotes Mahéswará Víswaprakásá, a lexicon written A. D. 1111, and is in his turn mentioned by Ráyamukuṭa, who composed his commentary on Amara in 1431.’ (Dr. Aufrecht’s preface, p. xiv.)

The Uṇádi Sútras (like the Prákrit Sútras of Vararuchi) have suffered by interpolations of examples and even whole rules, and

\* See Prof. Müller’s *Ancient Sanskrit Lit.* pp. 164-169.

many words at present appear in them which can hardly be reconciled with such an early date. Dr. Aufrecht mentions two, ' *dinára*' (3. 110) and ' *mihira*' (1. 52), which are evidently connected with the Latin *Denarius* and the Persiau *mehr*. But in the first of these instances Ujjwaladatta most satisfactorily explains the anomaly. In the Sútras as given in the Siddhánta Kaumudi, we read दोडो नुट् च ॥ दीनारः सुवर्णाभरणं ॥ but in Ujjwaladatta's earlier recension we have the following valuable addition दोडो नुट् च ॥ दोड् चये । चत्त्वादारन् प्रत्ययस्य नुडागमस्य । दीनारः सुवर्णाभरणं । स्तुत्रमिदं स्तूतीष्टन्ते देवटन्ते च न दश्यते ॥ "after the root ' *dīng*' in the sense of 'destruction,' the suffix *áran* is employed with the augment *n* (*nut*), as *dinára*, 'a golden ornament.' *This Sútra is not found in the Deva and Súti commentaries.*" The same remark is made in several other places.

In the editions hitherto printed, ' besides many other faults, sútras were often given as commentary,\* and the commentary turned into sútras' (Pref. p. xx.) ; these faults are here all corrected, and we have now an edition of this very valuable part of ancient Indian Grammar which criticism may safely depend upon. At the end, the editor adds a very useful philological Glossary, and a list of the principal *Uṇádi* suffixes which actually occur in Sanskrit. From the latter we extract the following,—the Sanskrit accent being marked by the Italic letter ; " *u*,—the oldest suffix of the Indo-Germanic languages. Ex. á'su ḡkvú, uru ḡvrvú, guru βapvú, tanu τavú, pas'u pecu, puru πολv, pṛithu πλατv, bahu παχv, báhu πῆχv, madhu μέθv. Compare in Latin genu, veru, curru, &c."

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*Pantschatantrum sive quinquepartitum de moribus exponens, ex Codd.*  
*MSS. edidit J. G. L. KOSEGARTEN. Pars II. 1859.*

Professor Kosegarten has here given, as a sequel to the first part published several years ago, a more ornate version of the stories of the Panchatantra. Beside the occasional *purpurei panni* of rhetorical description which are inserted here and there, we also find several variations in the stories themselves, and many of them ap-

\* Thus in Böhtlingk's ed. p. 15, we have in 1, 129, a new sútra *driṇáṭch shug-ghraswas'cha* disguised as part of the comm.

pear to bear a closer resemblance to those in the *Kalila wa Dímma*. The present fasciculus contains the first nine fables of the first book.

*Zwei Vedische Texte über Omina und Portenta von A. WEBER.*  
1, *Das Adbhuta Bráhmaṇa des Sáma Veda.* 2, *der Adbhutádhýága des Kaus'aki-sútra.* Berlin, 1859.

Dr. Weber in this brochure has given us the text of two Vedic works on omens and portents, accompanied by a translation and running commentary. The papers were read before the Royal Academy of Berlin, on the 10th and 24th of June, 1858, and they are now republished from the Academy's Transactions.

The *Adbhuta Bráhmaṇa* is the concluding part of the *Shaḍvín'sa Bráhmaṇa* of the *Sáma Veda*, and consists of twelve sections. Each section (from the 3rd) gives a formula to avert certain inauspicious phenomena,—each being directed to a different deity. The first is to be directed to the East and belongs to Indra, the second to the South and Yama, the third to the West and Varuṇa, the fourth to the North and Váisravana, the fifth to the Earth and Agni, the sixth to the Atmosphere and Váyu, the seventh to the Sky and Soma, the eighth to the highest Heaven (*param divam*) and Vishnu, the ninth to the nether Quarter (*adhastád dis'am*) and Rudra, the tenth to every Quarter and to Súrya. The two last are not found in some MSS. and are probably a later addition.

One of the most remarkable passages in this *Bráhmaṇa* is that which mentions certain portents connected with the temples and *images* of the gods (§ 10).

देवतायतनानि कम्पने दैवतप्रतिमा चसन्ति गायन्ति वृत्यन्ति स्फटन्ति स्विद्यन्त्यन्ति निमोलन्ति । “If the temples of the gods are shaken, or if the images of the gods laugh, sing, dance, burst, sweat, open or close their eyes.”

Dr. Weber appears, by his note on § 5, to entertain some doubt as to *patanga* meaning a ‘grasshopper’ as well as ‘a bird;’ but in the *Kumára Sambh. iv. 20*, *Mallinátha* expressly explains it by *S'abalha*.\*

\* The line in the K. S. is easily understood by any one who has seen his lamp covered with the *pháringas* (फङ्ग) of Bengal.

The Bráhmáya is followed by the 13th book of the Kausíka Sútras, which treats the same subject in a much fuller manner. The rules, however, are here given without any apparent order or method, and Dr. Weber argues for them a higher antiquity.

One of the most interesting passages is that which gives the formula to be used in case two ploughs become entangled. In the hymn here used we find a direct personification of the *furrow*, Sítá, —“black-eyed, bearing a lotus, beautiful in every limb, decked with a golden garland, the golden wife of Parjanya, the god of rain.” Two of the most living creations of the later Indian muse are thus dissolved by modern criticism into ancient personifications of natural objects,—the Sítá\* of the Rámáyana into the Vedic ploughman’s ‘furrow,’ and the Urvásí of Kálidása into the dawn which awoke him to his daily toil!

\* Cf. Rám. i. 66.

अथ मे छपतः चेचं लाङ्गलादुत्तिता ततः ।  
चेचं शोधयता लभ्या नाम्ना सीतेति विश्रुता ॥

#### ERRATA IN VOL. XXVIII.

P. 4. l. 19, *for* opposition *read* apposition.  
P. 28. l. 2, *infra*, *for* छर्वे । *read* छर्वा ।



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR OCTOBER, 1859.

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The Monthly General Meeting of the Asiatic Society was held on the 12th instant.

A. Grote, Esq., President, in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received.

1. From the Superintendent of the Ordnance Survey Office, Southampton, a copy of the account of the Principal Triangulation of the United Kingdom.
2. From the British Association for the Advancement of Science, Report of the 27th Meeting of that institution.
3. From the Royal Asiatic Society of London, Vol. XVII. P. 1, of the Journal of that Society.
4. From Prince Mahomed Buhram Shah, two copies of Marshman's History of India, translated into Persian by Abdurraheem.
5. From Dr. G. Buist—A series of specimens of the rocks around Point de Galle. These (Dr. Buist states) were of granite, fresh and decomposed, for the most part devoid of hornblende or mica. They abounded in crystals of cinnamon stone, and scales of iron glanee. The specimens shewed the rock in all its stages of decomposition. Passing on the one side to kaolin, on the other to laterite, the quartz in both cases slowly resisting change, but becoming absorbed in the general earthy mass at last. The laterite again was in many cases concentrating its iron into a red-black oxide. In some it had been broken up, and re-cemented into a conglomerate.

6. From R. Swinhoe, Esq., of H. M. Consulate, Amoy—A collection of Chinese bird skins, arrived but not yet received, in consequence of the closure of the Custom House during the Durga puja holidays.\*

7. H. M. the ex-King of Oudh. A snake, *DENDROPHIS ORNATA*.

8. Prince Mahomed Jalaludin, of Baligunge. A snake, the Raj-samp of the Bengalis, *BUNGARUS ANNULARIS*.

9. Dr. Crozier, two skulls of Horses.

10. Capt. W. H. Lowther, in command of the 1st Assam Local Battalion. The skin of a Binturong, *ARCTICTIS BINTURONG*, killed on the Singpho frontier of Upper Assam, where termed by the natives *Young*. Interesting with reference to the geographical distribution of this remarkable animal.

11. Baboo Rajendra Mallika, the carcass of a four-horned sheep the skull of which has been retained for the museum.

12. Capt. Eales, commanding the *Fire Queen*, the following specimens from Port Blair: A fish, *JULIS LUNARIS*, in spirit, and stuffed specimens of two other fishes, *TETRODON PUNCTATUS*, and a large undetermined *MURAENA*.

13. Capt. Hodge, commanding the guardship *Sesostris*, at Port Blair. Another considerable collection of fishes, a few birds, comprising a Parrot hitherto only known to inhabit the Nicobar Islands, two harmless snakes, *LYCODON AULICUS var*, and a young *DIPSAS*, and of mammalia a nearly perfect skeleton of *SUS ANDAMANENSIS*, another imperfect skeleton of a young Pig from the Nicobar islands, which appears to be the young of the ordinary domestic race, portions of the skeleton of a *Paradoxurus*, the particular species undeterminable, and the skin of a peculiar Rat.

The following gentlemen duly proposed at the last meeting were balloted for and elected ordinary members:—

Dr. C. Archer, Captain J. C. Haughton, Supdt. Port Blair (re-elected), A. Fisher, Esq. Dr. G. K. Hardie, L. B. Bowring, Esq. (re-elected) D. Fitzpatrick, Esq. c. s., Captain Forlong.

The following gentlemen were named for ballot as ordinary members at the next meeting:

\* Since received.

Major S. R. Tickell, Maulmain, proposed (for re-election) by Mr. W. S. Atkinson, seconded by the President.

J. Sanders, Esq., proposed by Mr. E. B. Cowell, seconded by Mr. Woodrow.

C. A. Elliott, Esq. c. s., proposed by Mr. Atkinson, seconded by the President.

The Council proposed Dr. Frederick of Batavia as a corresponding member of the Society.

Communications were received.

1. From Col. Baird Smith, c. b., officiating Secretary to the Government of India, a memorandum on the Irrawadi River by Lieut.-Col. A. Cunningham, Bengal Engineers.

2. From Baboo Radanath Sikdar, abstract of the Meteorological Observations taken at the Surveyor General's Office in the month of April 1859.

3. From R. Davies, Esq. Secretary to the Government of the Punjab a paper containing remarks on the Cataclysms of the Indus by Capt. Montgomerie, Bengal Engineers.

The paper was read by the Secretary. It will be published in the Journal.

Dr. Buist, Bombay, read a paper on the *Curia muria* islands to which remarkable group an unusual amount of attention had of late been drawn from their being represented as containing deposits of guano. They were five in number, situated in a fine semi-circular bay on the Southern shore of Arabia, betwixt the Sea of Oman and the Gulf of Aden, under the seventeenth northern parallel and fifty-seventh eastern meridian. This was the stormiest portion of the Arabian sea, subject at all seasons to violent storms of wind and rain, the occurrence of the latter forbidding the idea of guano being stored of any considerable commercial value. Though two degrees south of Bombay where  $58^{\circ}$  was a degree of cold rarely known, the Belot or Belood wind from the mountains to the west often brought down the thermometer to 40 degrees.

The islands are mostly plutonic, consisting of granite, porphyry and hornblende rocks, corresponding with those on the mainland

opposite the summit of the magnificent cliff on the northern shore of Hullany, where it springs up 1645 ft. above the sea, of tertiary limestone full of marine remains, similar to those prevailing in Egypt, Scinde, and the Punjab: the islands are nearly waterless, and are barren in the extreme. In 1835, when the islands were surveyed, the whole population consisted of thirty-five individuals nor have we any reason to suppose that they have since then been on the increase. They belonged to a considerable tribe on the mainland, who had always considered the Curia murias their own. A Mr. Ord roving in these seas in 1853 professed to have discovered enormous deposits of guano on the Curia muria, and ignorant of, or ignoring, the fact that this must needs have been rendered worthless by the rains, he so far gained the ear of Lord Clarendon that in 1854 H. M. S. *Juno* was commissioned to ascertain the fact. Subsequently the Imam of Muscat was applied to, to cede the islands, he having as much right to them as to make over Wight, Anglesey, or Sky to France. We were now arranging for the Red Sea Telegraph, and the time was most inopportune for disturbing the minds of the people on the sea board of Southern Arabia. Mr. Ord having appeared to claim execution of the treaty represented himself as having been resisted and threatened by hordes of natives. Accordingly a war steamer of the Royal Navy burning coal at £3 a ton, was sent out 30,000 miles, both to manifest the power and vindicate the honor of England against an enemy not numbering in all *ten* adult males—naked and unarmed as at the hour of their birth. It is needless to add that hostility or resistance were never dreamt of by a handful of harmless barbarians who had nothing to do but surrender at pleasure. But then the people of England were assured of their triumph, and the guano speculators were promised fortunes. Since 1857 shipping to the extent of 80,000 tons has visited the Curia murias, and the adventure utterly hopeless from the first, has in man-of-war and merchant-shipping charges probably occasioned a loss to the Commonwealth of not less than a quarter of a million sterling. In reality there is a small quantity of guano of excellent quality found in caves and crevices where the rain never reaches and the reports of the chemists on this mislead as to the remainder.

The thanks of the meeting were voted to Dr. Buist for his interesting communication.

The Officiating Librarian submitted the usual monthly report.

#### LIBRARY.

The Library has received the following accessions since the Meeting in September last.

#### *Presentations.*

Account of the Principal Triangulation of England, with a vol. of Plates.

—BY THE ORDNANCE SURVEY OFFICE.

Report of the British Association for the advancement of Science for 1857.—BY THE ASSOCIATION.

Tareekhé Hindosthan, being a Translation of Marshuan's History of India in Persian, 2 vols.—BY PRINCE BUHRAM SHAH.

The Oriental Christian Spectator for September, 1859.—BY THE EDITOR.

The Oriental Baptist for October, 1859.—BY THE EDITOR.

The Calcutta Christian Observer for October, 1859.—BY THE EDITOR.

The Athenaeum for July, 1859.—BY THE EDITOR.

Proceedings of the Royal Society, No. 35.—BY THE ROYAL SOCIETY OF LONDON.

The Atlantis, No. IV. for July, 1859.—BY THE MEMBERS OF THE CATHOLIC UNIVERSITY OF IRELAND.

Monographie des Guêpes Sociales par Henri de Saussure cahiers 10 and 11, with two plates.—BY THE AUTHOR.

Official Correspondence on the System of Revenue Survey and Assessment in the Bombay Presidency, 1859.—BY THE BOMBAY GOVERNMENT.

Bijdragen tot de Taal-land-en Volkenkunde van Nederlandsch Indie, Tweede deel, Derde Stuk.—BY THE BATAVIAN SOCIETY.

Proceedings of the Royal Geographical Society of London, No. IV.—BY THE SOCIETY.

#### *Purchased.*

Literary Gazette, Nos. 55 to 59.

Méthode pour étudier la langue Sanscrit. Par E. Burnouf.

Annales des Sciences Naturelles, Tome X. No. 5.

Deutsches Wörterbuch von Jacob Grimm und Wilhelm Grimm. Dritten Bandes Zweite Lieferung.

Mutanubbi Carmina cum Commentario Waliidii. Faseieulus Tertius.

The American Journal of Science and Arts for July, 1859.

The Quarterly Journal of the Geological Society for August, 1859.

The London, Edinburgh and Dublin Philosophical Magazine and Journal of Science for August, 1859.

The Annals and Magazine of Natural History for August, 1859.

Comptes Rendus, No. 26 of Tome 48 and Nos. 1, 2 and 3 of Tome 49.

Grammaire Sanscrit par Jules Oppert.

FOR NOVEMBER 1859.

The Monthly General Meeting of the Asiatic Society was held on the 2nd instant.

A. Grote, Esq., President, in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received.

1. From Lord Ulick Browne, Under-Secretary to the Government of Bengal, two sets of Photographic Drawings of the ancient buildings at Beejapore, the Ashar Mobarick, and the Mehteree Mehal, transmitted for the Society by the Right Hon'ble the Secretary of State for India.

2. From Baboo Kaliprosunno Singh, groups of Figures in clay on two platforms, by a native artist of Nuddea, the one representing a Bazar the other an Indigo Factory.

3. From the same, a copy of the *Govind lelamrita* by Roop Goswami.

4. From R. Swinhoe, Esq., H. M.'s Consulate, Amoy. A collection of snndries from Sonth China and Formosa : among them is the skull of a Deer, sent as that of the Spotted Deer of Formosa : it is apparently of an undescribed species, akin to the British Red Deer, and totally different from the Spotted Deer of India. Also a skull of the small Chinese Muntjac Deer ; and some fine skins, inclnding one of *Mustoza Sibirica*, and a flat skin of the common Indian Pangolin : and of reptiles, a large *Python molurus* from Formosa and a fine new *Bungarus*, &c.

5. Rev. H. Baker, Junior, of Mundakyum, Alipi, South Malabar. A dozen skins of the new spiny Dormonse *Platacanthomys lasiurus* ; and other skins of field Rats, and of Shrews from that vicinity.

6. Captain Hodge, commanding the guard ship *Sesostris*, at Port Blair. A few bird skins, comprising a fine new Woodpecker ; several reptiles, bringing the number of now ascertained *Reptilia* from the Andamans to 12, of which 5 are Lizards and 7 Snakes, 3

of the latter being venomous; another fine collection of fishes chiefly in spirit, and some Crustacea and sundries. A snake of the genus *Trigonocephalus* now arrived has fangs of extraordinary length, and, to all appearance it should be one of the most formidable of the tribe.

7. Baboo Ram Sehay Lall, native Doctor attached to the Police Levy, a double headed kitten, forwarded by Adjutant E. Berril of that corps.

8. Baboo Rajendra Mulliek, two dead monkeys.

#### READ A LETTER

From Dr. D. T. Morton, Tounghoo, desiring to withdraw from the Society in consequence of his intended departure for Europe.

The following gentlemen duly proposed at the last meeting were balloted for and elected ordinary members. /

Major S. R. Tickell, Moulmein (re-elected). J. Sanders, Esq., Presidency College, C. A. Elliot, Esq., C. S.

Dr. Frederiek of Batavia was also elected a corresponding member.

The following gentlemen were named for ballot as ordinary members at the next meeting.

The Hon'ble J. P. Grant, Lieut.-Governor of Bengal, proposed by the President and seconded by Dr. Thomson.

Moulvie Futteh Ally proposed by Mr. Atkinson, and seconded by the President.

F. Fisk Williams, Esq., proposed by Major Tytler, seconded by Mr. Atkinson.

F. A. Goodenough, Esq., proposed by G. G. Morris, Esq., and seconded by the President.

H. Leonard, Esq., C. E., proposed by the President and seconded by T. Oldham, Esq.

#### *Report from the Council.*

The Council beg to announce that they have adopted the recommendations of the Philological Committee contained in the following report, and request the Society's approval of the same.

#### REPORT OF PHILOLOGICAL COMMITTEE.

"The Philological Committee recommend to the Council, that a new series of the *Bibliotheca Indica* should be commenced, it hav-

ing been already resolved, that no new works should be undertaken in the existing series.

"They would also recommend that the translation of the Surya Siddhanta, as well as that of the Surya Siromani, (the former by Pundit Bapu Deva of Benares,) which Archdeacon Pratt has communicated to the Society, and which he has undertaken to superintend the publication of, be forthwith sent to the press to form the commencement of the new series. The Surya Siddhanta has already appeared in the original in our first series, and the translation will be a most valuable addition, as it will make the Sanscrit Astronomy intelligible to the scientific world in general.

"The Siromani is a shorter treatise, which serves admirably as an appendix to the larger work."

The Council in submitting the above report, beg to add that the present state of the Oriental Fund, quite justifies the Society in undertaking this new series. The assets, including Rs. 3,500 Company's Paper, amount to about Rs. 15,300 while the liabilities for editing charges, and unpaid printer's bills, &c., amount to about Rs. 6,000 leaving a balance in favor of the Fund of Rs. 9,300

#### COMMUNICATIONS RECEIVED.

1. From Lieut.-Col. A. P. Phayre, a paper on the History of the Shwe Dagon Pagoda at Rangoon with a sketch of its elevation.

A paper was read entitled an Itinerary in the Tenasserim Provinces, by Major Tickell with Botanical Notes by the Rev. C. S. P. Parish.

These papers will shortly appear in the Journal.

#### LIBRARY.

The following accessions have been made to the Library since the Meeting in October last.

#### *Presentations.*

The Oriental Baptist for November and December, 1859.—BY THE EDITOR.

The Calcutta Christian Observer for ditto ditto.—BY THE EDITORS.

The London, Edinburgh and Dublin Philosophical Magazine, Nos. 119 and 120 for September and October, 1859.

Bibidharta Sangraha for Magh, 1780.—BY THE EDITOR.

Proceedings of the Royal Society, No. 56.—BY THE BOYAL SOCIETY.

Annual Report of Superintendent of the Geological Survey of India for 1858-59.—**BY THE SUPERINTENDENT.**

Journal Asiatique, Tome XIII. No. 32 for June, 1859.—**BY THE ASIATIC SOCIETY OF PARIS.**

Pointed and Unpointed Romanic Alphabets compared, by G. G. Thompson.—**BY THE AUTHOR.**

Memoirs of the Geological Survey of India, Vol. 1st, Part III. 2 copies.—**BY THE HOME GOVERNMENT.**

Address at the Anniversary Meeting of the Royal Geographical Society.—**BY THE SOCIETY.**

Journal of the Statistical Society of London for September, 1859.—**BY THE SOCIETY.**

Madras Journal of Literature and Science for October and March, 1858-59.

Transactions of the Royal Geographical Society from May, 1857 to May, 1858, Vol. XIV.—**BY THE SOCIETY.**

The Oriental Christian Spectator for October 1859.—**BY THE EDITOR.**

Geographical Notice of the Royal Illustrated Atlas.—**BY DR. NORTON SHAW.**

The Athenæum for August and September, 1859.

Selections from the Records of the Bombay Government, No. 51. Mémoire of the Ruins of Babylon. By William Beaumont Selby, with plans.—**BY THE BOMBAY GOVERNMENT.**

*Purchased.*

Revue des Deux Mondes for 15th August, 1st and 15th September and 1st October, 1859, 4 Nos.

Annales des Sciences Naturelles, Tome X. No. 6, Tome XI. Nos. 1 and 2. The Literary Gazette, Nos. 60 to 68.

Comptes Rendus, Nos. 4 to 11, from 25th July to 12th September, 1859.

Journal des Savants for July, August and September, 1859.

Die Religion des Buddha von Carl Friedrich Kœppen, Zwerter Band.

Revue et Magasin de Zoologie, Nos. 7, 8 and 9.

The Annals and Magazine of Natural History, Nos. 21 and 22.

Die Lieder des Hafis, Zweite Band Dritte Heft.

Conchologia Ieronica, Parts 186 and 187.

Numismatique des Arabes avant l' Islamisme, par Victor Langlois.

Philosophie und Theologie, von Averoes, von Marcus Joseph Muller.

Westminster Review for October, 1859.

The Natural History Review for July, 1859.

The American Journal of Science and Arts for September, 1859.

Dr. Max Muller's Origin of the Introduction of Writing in the East.

FOR DECEMBER, 1859.

The Monthly General Meeting of the Asiatic Society was held on the 7th instant.

A. Grote Esq., President, in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received—

1. From C. H. Lushington, Esq., Secretary to the Government of India, specimens of rupees recovered from the wreck of the P. and O. Company's Steamer *Ava* by the divers of the H. M. S. *Retribution*, sent by Commodore Edgell.

2. From the Superintendent Geological Survey of India, memoirs of the Geological Survey, vol. I. p. III.

3. From the Bombay Government No. 51 of the Selections from its Records being a memoir of the Ruins of Babylon, by William Beaumont Selby, with plans.

4. E. S. Layard, Esq., in charge of the Museum in Capetown. A valuable collection of skins of mammalia and birds from South Africa comprising 28 species of mammalia and 39 species of birds, of which 21 species of mammalian and 18 species of birds are wholly new to the Society's collections.

5. Babu Rajendra Mullick, several dead birds, comprising one of the desiderata in every zoological museum, a magnificent male specimen of the Golden Pheasant.

6. Captain Hodge, commanding the guard-ship *Sesostris* at Port Blair. A further collection of sundries from the Andaman Islands.

7. Rev. J. Cave-Brown. A collection of reptiles, insects, &c., preserved in spirits from Subhatoo.

The following gentlemen duly proposed at the last meeting, were ballotted for and elected ordinary members.

The Hon'ble J. P. Grant, Lieutenant-Governor of Bengal.

Moulavee Futteh Ally, serishtadar of superintendent of the Mysore Princes' Office.

F. A. Goodenough, Esq., and H. Leonard, Esq., C. E.

The following gentlemen were named for ballot, as ordinary members at the next meeting.

Prince Mahomed Jallaluddin of Mysore, proposed by Mr. Atkinson, and seconded by the President.

T. R. Grant, Esq., proposed by Dr. Boycott, and seconded by Dr. Eatwell.

H. V. Bayley, Esq., proposed (for re-election) by the President, and seconded by Dr. Thomson.

W. J. Rivett Carnac, Esq., proposed by the President, and seconded by Captain W. N. Lees.

Baboo Preonuath Sett, proposed by Babu Rajendra Lall Mittra, and seconded by the President.

Dr. Theodore Duka, proposed by the President, and seconded by Mr. Stainforth.

Major J. J. M. Innes, Bengal Engineers, proposed by Mr. Atkinson, and seconded by Col. Baird Smith.

G. Lindsay, Esq., proposed by Mr. A. Fisher, and seconded by Mr. H. Blanford.

Rev. J. C. Thompson, proposed (for re-election) by Mr. Jones, and seconded by Dr. Boycott.

C. Oldham, Esq., proposed by Mr. T. Oldham, and seconded by the President.

Capt. Alexander Fraser, Bengal Engineers, proposed by Mr. Atkinson, and seconded by Capt. Dickens.

David K. Mair, Esq., proposed by Mr. A. Fisher, and seconded by Dr. Boycott.

#### Read a Letter

From B. H. Hodgson, Esq., conveying to the Society his deep sense of the honor it had conferred on him by electing him an Honorary Member, and assuring the Society of his hearty interest in its welfare.

Communications were received—

1. From R. B. Chapman, Esq., Under-Seey. to the Government of India, forwarding copies of statements of Doodnauth Tewary, and Jhindoo, converts in Port Blair.

2. From Baboo Radha Nath Sikdar, an abstract of the hourly meteorological observations taken at the Surveyor General's Office in the month of May last.

Colonel Baird Smith exhibited and explained to the Society the series of plans of Delhi, that have been prepared to illustrate the topography of the place, and the late operations against it in 1857.

The thanks of the meeting were voted to Colonel Smith, for his able and interesting explanation of the plans exhibited to the Society.

The Officiating Librarian submitted the usual report.

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*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1859.*

Latitude  $22^{\circ} 33' 1''$  North. Longitude  $88^{\circ} 20' 34''$  East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

Date.	Mean Height of the Barometer at $32^{\circ}$ Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Tempera- ture during the day.			
		Max.	Min.	Diff.		Max.	Min.	Diff.	
1	Sunday.	Inches.	Inches.	Inches.	°	°	°	°	
2	29.798	29.859	29.717	0.142	85.0	94.2	77.4	16.8	
3	.773	.841	.674	.167	87.1	97.0	79.6	17.4	
4	.778	.905	.652	.253	85.5	97.3	72.6	24.7	
5	.791	.878	.708	.170	78.9	91.4	72.0	19.4	
6	.775	.872	.696	.176	82.9	91.0	73.4	17.6	
7	.739	.786	.671	.115	81.6	93.9	75.1	18.8	
8	Sunday.								
9	.769	.838	.701	.137	85.3	93.0	78.6	14.4	
10	.747	.830	.660	.170	87.0	95.6	80.0	15.6	
11	.689	.761	.563	.198	88.1	98.2	81.2	17.0	
12	.685	.731	.588	.143	86.7	96.4	80.0	16.4	
13	.674	.730	.594	.136	89.0	99.4	80.6	18.8	
14	.686	.742	.602	.140	87.9	98.6	81.2	17.4	
15	Sunday.								
16	.689	.755	.606	.149	87.6	98.6	78.6	20.0	
17	.691	.749	.618	.131	87.5	98.4	80.4	18.0	
18	.752	.824	.679	.145	85.8	95.0	76.2	18.8	
19	.649	.715	.554	.161	88.5	95.3	83.2	12.1	
20	.597	.660	.500	.160	88.4	95.8	81.7	14.1	
21	.627	.678	.527	.151	87.1	97.5	79.5	18.0	
22	Sunday.								
23	.651	.707	.579	.128	88.9	96.8	83.0	13.8	
24	.667	.710	.590	.120	87.3	93.6	77.4	16.2	
25	.672	.722	.557	.165	84.8	95.4	76.0	19.4	
26	.661	.730	.590	.140	86.0	93.8	77.6	16.2	
27	.692	.781	.629	.152	85.9	93.2	77.4	15.8	
28	.677	.750	.580	.170	85.3	94.4	76.2	18.2	
29	Sunday.								
30	.602	.674	.506	.168	88.4	97.8	82.2	15.6	
31	.640	.709	.569	.140	82.6	90.5	78.0	12.5	

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1859.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
1	Sunday.	o	o	o	Inches.	T. gr.	T. gr.	
2	75.7	9.3	71.0	14.0	0.751	8.02	4.51	0.64
3	78.6	8.5	74.3	12.8	.835	.88	.45	.67
4	76.7	8.8	72.3	13.2	.783	.36	.36	.66
5	73.4	5.5	70.6	8.3	.741	.02	2.45	.77
6	75.9	7.0	72.4	10.5	.785	.41	3.38	.71
7	75.7	5.9	72.7	8.9	.792	.52	2.82	.75
8	Sunday.							
9	79.3	6.0	76.3	9.0	.890	9.52	3.12	.75
10	80.1	6.9	76.6	10.4	.899	.57	.72	.72
11	80.2	7.9	76.2	11.9	.887	.43	4.29	.69
12	78.5	8.2	74.4	12.3	.838	8.93	.25	.68
13	80.0	9.0	75.5	13.5	.868	9.20	.88	.65
14	79.6	8.3	75.4	12.5	.865	.18	.46	.67
15	Sunday.							
16	79.3	8.3	75.1	12.5	.857	.10	.42	.67
17	79.3	8.2	75.2	12.3	.860	.15	.34	.68
18	78.8	7.0	75.3	10.5	.862	.19	3.64	.72
19	82.9	5.6	80.1	8.4	1.005	10.67	.21	.77
20	81.6	6.8	78.2	10.2	0.946	.05	.79	.73
21	79.8	7.3	76.1	11.0	.885	9.42	.91	.71
22	Sunday.							
23	82.9	6.0	79.9	9.0	.998	10.59	.45	.75
24	81.4	5.9	78.4	8.9	.952	.12	.29	.76
25	78.6	6.2	75.5	9.3	.868	9.29	.17	.75
26	80.3	5.7	77.4	8.6	.922	.83	.08	.76
27	80.8	5.1	78.2	7.7	.946	10.09	2.78	.78
28	80.1	5.2	77.5	7.8	.925	9.88	.76	.78
29	Sunday.							
30	81.9	6.5	78.6	9.8	.958	10.17	3.67	.74
31	78.0	4.6	75.7	6.9	.873	9.38	2.30	.80

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1859.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

Hour.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	29.714	29.852	29.607	0.245	81.7	85.6	72.8	12.8
	.702	.827	.590	.237	81.4	85.1	72.8	12.3
	.691	.805	.579	.226	80.9	85.5	72.0	13.5
	.682	.805	.562	.243	80.8	84.8	72.4	12.4
	.689	.797	.571	.226	80.1	84.7	72.4	12.3
	.705	.808	.593	.215	79.8	84.6	72.6	12.0
	.719	.812	.615	.197	79.9	84.8	73.0	11.8
	.736	.837	.634	.203	81.1	85.8	74.4	11.4
	.749	.870	.644	.226	85.1	88.6	79.2	9.4
	.758	.878	.660	.218	87.5	90.6	81.6	9.0
	.756	.872	.655	.217	89.9	94.1	83.2	10.9
	.743	.856	.641	.215	92.0	95.2	84.2	11.0
Noon.	.727	.825	.626	.199	93.3	96.7	85.4	11.3
	.698	.795	.603	.192	94.3	98.4	86.9	11.5
	.668	.771	.559	.212	94.7	99.2	84.2	15.0
	.642	.742	.525	.217	94.3	99.4	83.3	16.1
	.623	.761	.500	.261	93.3	98.6	76.2	22.4
	.618	.717	.506	.211	94.1	96.2	75.2	21.0
	.640	.728	.526	.202	88.7	94.0	75.1	18.9
	.665	.746	.553	.193	85.8	90.2	76.8	13.4
	.691	.803	.582	.221	84.3	88.0	76.4	11.6
	.711	.905	.617	.288	82.7	87.4	72.6	14.8
	.720	.863	.630	.233	82.2	87.4	73.6	13.8
	.717	.836	.631	.205	81.7	86.4	73.0	13.4

The Mean Height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

*Abstract of the Result of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1859.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

Hour.	Mean Wet Bulb Thermometer.			Computed Dew point.	Dry Bulb above Dew point.	Mean elastic force of Vapour.	Mean Weight of Vapour required in a Cubic foot of Air.	Additional weight of vapour required for complete saturation.	Mean degree of humidity, complete saturation being unity.
	o	o	Dry Bulb above Wet.						
Mid-night.	77.4	4.3	75.2	6.5	0.860	9.24	2.13	0.81	
1	77.4	4.0	75.4	6.0	.865	.32	1.95	.83	
2	77.3	3.6	75.5	5.4	.868	.37	.73	.84	
3	77.3	3.5	75.5	5.3	.868	.37	.70	.85	
4	76.9	3.2	75.3	4.8	.862	.31	.53	.86	
5	76.7	3.1	75.1	4.7	.857	.25	.50	.86	
6	76.9	3.0	75.4	4.5	.865	.34	.44	.87	
7	77.8	3.3	76.1	5.0	.885	.53	.64	.85	
8	79.6	5.5	76.8	8.3	.905	.67	2.90	.77	
9	80.6	6.9	77.1	10.4	.913	.72	3.77	.72	
10	81.5	8.4	77.3	12.6	.919	.72	4.74	.67	
11	81.9	10.1	76.8	15.2	.905	.54	5.82	.62	
Noon.	82.2	11.1	76.6	16.7	.899	.44	6.51	.59	
1	82.5	11.8	76.6	17.7	.899	.42	.99	.57	
2	82.7	12.0	76.7	18.0	.902	.45	7.15	.57	
3	82.2	12.1	76.1	18.2	.885	.28	.13	.57	
4	81.7	11.6	75.9	17.4	.879	.24	6.71	.58	
5	80.7	10.4	75.5	15.6	.868	.16	5.81	.61	
6	79.5	9.2	74.9	13.8	.851	.02	4.94	.65	
7	78.3	7.5	74.5	11.3	.840	8.98	3.85	.70	
8	77.9	6.4	74.7	9.6	.846	9.05	.23	.74	
9	77.3	5.4	74.6	8.1	.843	.05	2.67	.77	
10	77.3	4.9	74.8	7.4	.849	.13	.41	.79	
11	77.1	4.6	74.8	6.9	.849	.13	.24	.80	

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1859.*

Solar Radiation, Weather, &amp;c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	General Aspect of the Sky.
1	o	Inches.		
2	137.0	..	W. & S. & S. E.	Cloudless till Noon. Scatd. $\curvearrowleft$ i till 6 p. m. cloudless afterwards.
3	140.0	..	S. & S. E.	Cloudless till 8 a. m. Scatd. $\curvearrowleft$ i till 4 p. m. cloudless afterwards.
4	139.9	1.36	S.	Cloudless till 3 a. m. Scatd. clouds till 3 p. m. cloudy afterwards ; also raining & thundering & lightning between 6 & 9 p. m.
5	124.0	..	S. E.	Scatd. clouds or cloudy the whole day ; also thundering at 2 p. m.
6	129.9	..	S. E.	Cloudless till 8 a. m. Scatd. $\curvearrowleft$ i & $\curvearrowright$ i afterwards.
7	125.0	0.26	S. E.	Scatd. clouds till 2 p. m. cloudy till 7 p. m. Scatd. $\curvearrowleft$ i & $\curvearrowright$ i afterwards ; also raining & thundering & lightning between 3 & 6 p. m.
8	Sunday.			
9	148.9	..	S. & S. E. & calm.	Cloudless till 7 a. m. Scatd. $\curvearrowright$ i & $\curvearrowleft$ i afterwards.
10	136.2	..	S. & S. E. & S. W.	Cloudless till 7 a. m. Scatd. $\curvearrowleft$ i afterwards.
11	139.2	..	S. & S. W.	Cloudless till Noon. Scatd. $\curvearrowleft$ i till 4 p. m. cloudy till 8 p. m. Scatd. $\curvearrowright$ i afterwards.
12	140.2	..	S. E. & S.	Scatd. clouds till 7 a. m. ; cloudless till Noon Scatd. $\curvearrowright$ i &c. afterwards.
13	142.6	..	S. W. & S. E. & E.	Cloudless till 3 a. m. Scatd. $\curvearrowleft$ i & $\curvearrowright$ i till 5 p. m. cloudless afterwards.
14	138.0	..	S. & E.	Cloudless till 11 a. m. Scatd. $\curvearrowright$ i till 3 p. m. cloudy afterwards.
15	Sunday.			
16	142.8	..	N. & S. & E.	Scatd. clouds till 6 a. m. cloudless till 1 p. m. Scatd. $\curvearrowleft$ i till 8 p. m. Scatd. $\curvearrowright$ i afterwards.
17	138.9	..	S.	Cloudless till 3 a. m. Scatd. $\curvearrowright$ i till 7 a. m. cloudless till 11 a. m. Scatd. $\curvearrowright$ i till 3 p. m. cloudy afterwards ; also thundering at 7 p. m.
18	129.8	..	S. & E.	Scatd. clouds of various kind.
19	130.4	..	S.	Scatd. clouds of various kind till 7 p. m. cloudless afterwards.
20	129.0	..	S.	Scatd. clouds till 7 a. m. Scatd. $\curvearrowleft$ i & $\curvearrowright$ i till 4 p. m. cloudless afterwards.

$\curvearrowleft$ i Cirri,  $\curvearrowright$ i cirro strati,  $\curvearrowleft$ i cumuli,  $\curvearrowleft$ i cumulo strati,  $\curvearrowright$ i nimbi,  $\curvearrowleft$ i strati,  $\curvearrowright$ i cirro cumuli.

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taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1859.*

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground. Inches.	Prevailing direction of the Wind.	General Aspect of the Sky.
21	131.0	..	E. & S. E. & S.	Cloudy till 4 A. M. Scatd. $\curvearrowleft$ i & $\curvearrowright$ i till 6 P. M. cloudy afterwards; also slightly drizzling at 8 P. M.
22	Sunday.	0.78		
23	139.0	..	S.	Cloudless till 7 A. M. Scatd. $\curvearrowleft$ i afterwards.
24	..	..	S.	Scatd. clouds; also lightning and drizzling at 9 P. M.
25	130.0	0.50	S. & E.	Cloudy, also raining & thundering & lightning at 6 & 7 P. M.
26	131.0	..	S. & N. E. & E.	Cloudless till 5 A. M. Scatd. $\curvearrowright$ i till 5 P. M. cloudless afterwards.
27	..	0.12	S. & E. & S. E.	Cloudless till 3 A. M. cloudy afterwards; also thundering & lightning & drizzling between 8 & 11 P. M.
28	131.8	..	S. & S. W.	Scatd. clouds; also drizzled slightly at Midnight.
29	Sunday.			
30	135.5	..	S. & E.	Cloudless till 6 A. M. Scatd. $\curvearrowleft$ i & $\curvearrowright$ i afterwards.
31	..	0.16	E. & S. E.	Cloudy till 6 P. M. cloudless afterwards; also drizzled between 3 & 6 A. M.

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in the month of May, 1859.*

## MONTHLY RESULTS.

			Inches.
Mean height of the Barometer for the month,	..	..	29.699
Max. height of the Barometer, occurred at 9 p. m. on the 4th,	..	..	29.905
Min. height of the Barometer, occurred at 4 p. m. on the 20th,	..	..	29.500
<i>Extreme Range</i> of the Barometer during the month,	..	..	0.405
Mean of the Daily Max. Pressures,	..	..	29.767
Ditto ditto Min. ditto, ..	..	..	29.612
<i>Mean Daily range</i> of the Barometer during the month,	..	..	0.155

			°
Mean Dry Bulb Thermometer for the month,	..	..	86.1
Max. Temperature, occurred at 3 p. m. on the 13th,	..	..	99.4
Min. Temperature occurred at 2 a. m. on the 5th,	..	..	72.0
<i>Extreme Range</i> of the Temperature during the month,	..	..	27.4
Mean of the Daily Max. Temperatures,	..	..	95.5
Ditto ditto Min. ditto,	..	..	78.4
<i>Mean Daily range</i> of the Temperatures during the month,	..	..	17.1

			°
Mean Wet Bulb Thermometer for the month,	..	..	79.2
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,	..	..	6.9
Computed Mean Dew Point for the month,	..	..	75.7
Mean Dry Bulb Thermometer above computed Mean Dew Point,	..	..	10.4

			Inches.
Mean Elastic force of vapour for the month, ..	..	..	0.873

			Troy grains.
Mean weight of vapour for the month, ..	..	..	9.32
Additional weight of vapour required for complete saturation,	..	..	3.63
Mean degree of Humidity for the month, complete saturation being unity,	..	..	0.72

			Inches.
Rained 9 days.—Max. fall of rain during 24 hours, ..	..	..	1.36
Total amount of rain during the month, ..	..	..	3.18
Prevailing direction of the Wind, ..	..	..	S. & S. E. & E.

*Abstract of the Results of the Hourly Meteorological Observations  
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MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	No. of days.												Calm.	Rain on.	N. W.	Rain on.	Calm.
	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	W.						
Midnight.	1	1	4	1	5	13				1		1		1		1	3
1	1	1	4	5	5	13				1		1		1		1	
2	1	1	4	5	5	13				1		1		1		1	
3	1	1	3	5	11					1		1		1		1	
4	1	2	3	6	11					1		1		1		1	
5	1	2	4	5	12					1		1		1		1	
6	1	1	5	5	11					2		1		1			
7	1	1	4	6	11					1		1		2			
8	1	1		8	13					2		2		1			
9	2		2	5	14					2		2		1			
10	1		2	6	14					5		5		1			
11	1		2	4	14												
Noon.			2	7	15					2		1					
1			2	7	14					2		1					
2			2	7	12					4		1					
3			2	6	12					5		1					
4			1	4	12					7	1						2
5	1		1	4	16					4							
6		1	3	4	14					1		1		1		1	
7	1	1	6	1	4	13	1			2							1
8	1	1	5	1	7	12				8							1
9		2	1	8	2	7				8							
10	1		8	1	8	8				8							
11	1		11	1	6	8				8							



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